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# QUALITY OF BATHING WATER

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# QUALITY OF BATHING WATER 1993

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**Report**

## Maps

# ERRATA

p44: The following text: "According to the Spanish classification, 25 and 71% respectively were classified as categories 2 and 1."

is to be replaced by:

"According to the Spanish classification, 71 and 25% respectively were classified as categories 2 and 1."

p47: The following text: "For inland waters, the compliance rate has slightly decreased in comparison with 1992. This seems to be the consequence of a prolonged period of drought."

is to be replaced by:

"For inland waters, the compliance rate has slightly increased in comparison with 1992."

# Notice to the reader

The annual report published by the Commission is intended to inform the public of the quality of bathing water throughout the Community on the basis of a summary of the results supplied by the Member States. In order to provide objective and comparable information, the conformity of bathing areas is assessed against the values given in the Annex to Directive 76/160/EEC.

The Annex sets two kinds of values: mandatory values which must be respected, and more stringent guide values which constitute quality objectives which Member States should endeavour to respect.

This report does not refer to the stricter national values which some Member States have set in their national legislation under Article 7 of the Directive.

The Annex to the Directive offers a choice between various methods of analysis for some of the parameters, including those for total and faecal coliforms. Recent scientific progress and many years' experience with implementation of the Directive have revealed various problems with the comparability of the methods used and with the measures taken to implement them. To avoid and help the laboratories in the Member States to overcome these difficulties, the Commission is organizing comparative studies of microbiological methods of analysing seawater. This work is being carried out under the measurements and testing programme and will take two years. It will not be possible to draw conclusions and to consider the consequences for implementation of Directive 76/160/EEC until then.

It therefore has to be accepted that the results in this report are subject to a certain degree of imprecision dictated by the state of the art and that this could be significant, particularly in borderline cases. Nevertheless, the methods of analysis used by the Member States are prescribed in the Directive and although there is room for improvement in the comparability of the data, in no way does this detract from the value of the information which they provide.

The report is supplemented by a series of maps.

The *report* describes the general quality of bathing water in the Community as well as the specific situation in each Member State for the last bathing season. It also contains summary tables of the results for the microbiological and physico-chemical parameters. For each of these parameters, the number of bathing areas sampled and the number of 'non-complying areas' are detailed. Bathing areas are classified as not complying if more than 5% of the samples taken in the course of the bathing season fail to conform with the 'mandatory (I) values' specified in the Annex.

The *maps* show the quality of bathing water in the 1993 bathing season and indicate which bathing areas in each district complied with the microbiological

standards. Detailed microbiological, physical and chemical data for each bathing area are given on the reverse of the maps.

The symbols used on the maps have the following meaning:

*blue symbol*: the bathing area complies on the basis of the mandatory values for total coliforms and faecal coliforms. These two parameters have been chosen because they are good indicators of the risks to public health;

*red symbol*: the bathing area does not comply on the basis of the mandatory values for total and faecal coliforms;

*grey symbol*: bathing area for which the sampling frequency is less than that required by the Directive and it is therefore impossible to assess conformity. A minimum of one sample per fortnight is required during the bathing season for total and faecal coliforms. The sampling frequency may be halved if sampling carried out during preceding years produced results appreciably better than those specified in the Annex to the Directive, in which case the area is presumed to comply. However, this reduction does not include the sample which must be taken two weeks before the start of the bathing season;

*black symbol*: an area at which the competent authorities have temporarily prohibited bathing. This information is published at the request of the Member State, since the Directive imposes no obligation to prohibit bathing.

These different symbols are combined if there are several bathing areas in the same administrative area. In these cases, the size of the composite symbol is proportional to the number of bathing areas it represents. Conformity is also shown in this proportional way.

The sequential numbering makes it possible to identify, on the reverse of the maps, individual administrative areas together with the relevant detailed information about the bathing water.

# Introduction

## 1. General remarks

This is the 11th report on the quality of bathing water. However, it is the first report published since the adoption of Council Directive 91/692/EEC standardizing and rationalizing reports on the implementation of certain directives relating to the environment.

Sectoral reports will be published on a three-year basis. The first report covering the period from 1993 to 1995 will be published in June 1997 and will review implementation of the directives concerning water protection. It will be followed in 1998 by a sectoral report on air quality and in 1999 by a report on waste.

Nevertheless, the report on the quality of bathing water is different from the others in that it will still be published annually. This is to allow the public to receive the traditional information at the beginning of each bathing season.

During the 1993 bathing season, there was a slight improvement in the quality of bathing water in the Community. For some years now, quality has remained constant thanks to the efforts of Member States and their implementation of wastewater treatment programmes. As in previous years, the main problems relate to freshwater quality.

As regards policy on water, particularly protection of bathing water quality, 1993 was marked by the debate on subsidiarity. Various questions were raised, including the question as to whether Directive 76/160/EEC should be repealed for reasons of subsidiarity. Reactions were contradictory and in many cases passions were aroused. Not only politicians, but also consumer associations, environmental protection organizations and members of the general public contributed to the debate.

At the European Council in Lisbon, the Commission, with a view to reconciling Community regulations with the principle of subsidiarity, undertook to prepare a report reappraising existing legislation. This commitment was reiterated in the conclusions of the European Council in Edinburgh.

In the case of Directive 76/160/EEC on the quality of bathing water, revision proved to be the most suitable response to the principle of subsidiarity.

As the Directive is one of the older legal instruments — adopted by the Council in December 1975 — there has been some controversy in recent years, chiefly because it has not been adapted to scientific and technical progress. Moreover, experience in the Member States, which together monitor more than 16 000 bathing

areas, demonstrates that it is difficult to apply some of the provisions in the Directive as it stands.

The reason why the Commission is in favour of revising Directive 76/160/EEC concerning the quality of bathing water is that it considers that the health of bathers cannot be protected by a range of different standards. From an epidemiological point of view, there are very few reliable quality indicators, so many different countries throughout the world (USA, Canada, Israel, Russia, etc.) have laws which apply microbiological indicators like coliforms and/or streptococci, although limit values may vary from one country to another according to the level of protection desired. The whole point of Community legislation is to guarantee the same level of protection throughout the Member States of the Community. By applying the same criteria, members of the public can now evaluate the risks they take at any given bathing area. Naturally, Member States are free to establish additional quality criteria according to special local conditions.

Bathing is an important aspect of tourism, and the tourist industry needs common criteria throughout the Community to allow holiday-makers to make unbiased choices. In view of the current economic crisis, it is essential to protect the rules of competition.

In terms of cost, it may seem a luxury to apply a directive on protection of bathing waters at a time when all Member States are facing budgetary restrictions. However, it is clearly unacceptable that any policy should be allowed to make savings which could affect public health. Moreover, in terms of keeping legislation up to date with scientific progress, it is more economical to make policy at Community level. Finally, the White Paper, which is concerned principally with employment, emphasizes the importance of environment policy, which must be part and parcel of economic recovery.

## 2. Revision of Directive 76/160/EEC

As mentioned above, the purpose of revising the Directive concerning the quality of bathing water is to adapt the present text to scientific progress and to take account of the experience gained. It will also be simplified. The revised version has been prepared by the Commission's technical units after consulting the Member States and scientists. The proposal was adopted by the Commission at the beginning of February 1994. This text will be considered, in the coming months, by the Council in cooperation with the European Parliament after seeking the opinion of the Economic and Social Committee and the Committee of the Regions.

The revision will clarify certain articles of Directive 76/160/EEC to facilitate the assessment of bathing water compliance and to reinforce the information available to the public. A committee for adaptation to technical progress should be set up for updating the Directive when necessary.

Furthermore, the possibility of prohibiting bathing temporarily should be a more obvious and effective way of protecting the health of bathers. Also, the new con-

cept of 'water of excellent quality' should provide more accurate information on the state of the environment.

The Annex to the Directive has also been amended to remove redundant parameters or parameters for which no limit value has been set. It focuses on the most appropriate pollution indicators for the protection of health and the environment.

### 3. DG XII's measurements and testing programme

By Decision 92/247/EEC, the Council adopted on 29 April 1992 a specific research and technological development programme in the field of measurements and testing.

The Commission selected 35 projects out of 368 proposals to receive Community funding. One of these is the programme on seawater microbiology.

This research project is designed to support regulations and directives by comparing the methods of analysis used by the Member States for implementing Directive 76/160/EEC concerning bathing water quality.

The methods studied concern faecal coliforms and faecal streptococci. The preliminary stages of the project set out to ensure that these methods were accurate and reproducible. Tests were conducted on artificially contaminated samples.

During the final stage, enumeration methods will be tested on naturally contaminated samples from the Baltic Sea, the Irish Sea, the English Channel, the South Atlantic and the Mediterranean.

Final conclusions will be reached and published only after completion of the project. Nevertheless, some scientific evidence already seems to be confirmed:

(i) *Escherichia coli* is the most reliable indicator among faecal coliforms, and in fact the ISO recently adopted this as an indicator.

(ii) Of the 20 pure faecal streptococci strains tested, five were found to be most representative and to react best to methods of analysis; these same strains have also been adopted by the ISO.

### 4. The blue flag campaign

The blue flag campaign, which is run by the Foundation for Environmental Education in Europe (FEEE), has received much publicity for many years now. However, it has caused considerable confusion and many think that it is a Commission scheme.

Although the Commission does provide financial support, as it does to other organizations or private undertakings, the campaign is nevertheless a scheme set up by a non-governmental organization based in Copenhagen.

Blue flags are awarded to beaches which satisfy criteria relating to water quality, bathers' safety and beach facilities and which conduct environmental information campaigns. As far as water quality is concerned, the FEEE sets out to emphasize water of excellent quality. This criterion of excellence is assessed in terms of the guide values given in Directive 76/160/EEC for coliforms (total and faecal) and streptococci.

It is important to emphasize that the participation of the national and/or local administrations in the campaign is entirely voluntary and that they must first apply for membership of the FEEE. Thus in no respect does the number of blue flags awarded to the different Member States reflect the general quality of the environment at their resorts, and neither can the awards be made on that basis.

In the 1992 bathing season, the FEEE awarded 1 203 blue flags. Awards for the 1993 season will be made in June 1994. The list of beaches awarded blue flags can be obtained from the FEEE at the following address:

FEEE, European Office
Friluftrådet
Olof Palmes Gade 10
DK-2100 Copenhagen

# Summary

Every year the Member States have submitted data on the microbiological and physico-chemical quality of their bathing water, as required by Article 13 of Directive 76/160/EEC. As of this year, reports must now comply with Directive 91/692/EEC and must be in digital form.

As in previous bathing seasons, it is difficult to discern any general trend since the situations in the various Member States of the Community vary so widely. Nevertheless, there is still a marked difference in quality between seawater and freshwater, as has been observed in the past.

Seawater quality was high or even excellent in many places, whereas critical levels were reported at many inland sites. Usually, these were attributable to the summer weather which attracted bathers just at the time when the water-renewal rate was insufficient.

## 1. Seawater quality

Table 1 summarizes the results for each Member State with the exception of Luxembourg which has no coastline.

A total of 11 358 bathing areas have been identified throughout the Community. In the 1993 bathing season, 88.3% of these complied with the total coliform and faecal coliform standards set by the Directive. If only the areas sampled at the required frequency are considered, this compliance rate rises to 92.7%, since the sampling frequency is toolow in 4.8% of the areas.

***Table 1* — Results for seawater**

(T = total number of sampling points; C (%) = percentage of points with required monitoring frequency and complying with the mandatory values for total and faecal coliforms; I (%) = percentage of points with inadequate sampling frequency).

| | T | C (%) | I (%) |
|---|---|---|---|
| Belgium | 39 | 82 | 0.0 |
| Denmark (1) | 1 180 | 96 | 0.0 |
| Germany | 436 | 82 | 7.3 |
| Greece | 1 250 | 97 | 0.8 |
| Spain | 1 405 | 96 | 0.4 |
| France | 1 856 | 90 | 8.9 |
| Ireland | 90 | 96 | 0.0 |
| Italy | 4 288 | 94 | 6.7 |
| Netherlands (1) | 45 | 100 | 13.3 |
| Portugal | 312 | 90 | 10.9 |
| United Kingdom | 457 | 80 | 0.0 |

NB: See 'Notice to the reader' for comments on the comparability of data.
(1) Member States from which data only on faecal coliforms are available.

Reference to the figures for previous bathing seasons given in Table 2 shows that bathing water quality has improved substantially over the last three years. On the other hand, the percentage of points with inadequate sampling frequency increased sharply during the 1993 bathing season. This is because the Commission paid special attention to the ways in which Member States were applying the option of reducing sampling frequency and in many cases irregularities were detected.

***Table 2* — Results for 1991, 1992 and 1993**

(T = total number of sampling points; C (%) = percentage of all points identified complying with the mandatory values for total and faecal coliforms; C' (%) = percentage of points with required monitoring frequency and complying with the mandatory values for total and faecal coliforms; I (%) = percentage of points with inadequate sampling frequency)

| Year | T | C (%) | C' (%) | I (%) |
|---|---|---|---|---|
| 1991 | 10 275 | 78 | 80 | 2.6 |
| 1992 | 10 977 | 89 | 91 | 2.4 |
| 1993 | 11 358 | 88 | 93 | 4.8 |

## 2. Freshwater quality

Table 3 summarizes the results for each Member State with the exception of the United Kingdom, which has not identified any inland bathing areas.

A total of 5 041 freshwater bathing areas have been identified throughout the Community. In the 1993 bathing season, 65.5% of these complied with the total coliform and faecal coliform standards set by the Directive. If only the areas sampled at the required frequency are considered, this compliance rate rises to 82.9%.

### *Table 3* — Results for freshwater bathing areas

(T = Total number of sampling points; C (%) = percentage of points with required mandatory frequency and complying with the mandatory values for total and faecal coliforms; I (%) = percentage of points with inadequate sampling frequency)

| | T | C (%) | I (%) |
|---|---|---|---|
| Belgium | 85 | 64 | 5.9 |
| Denmark (1) | 108 | 95 | 0.0 |
| Germany | 1 702 | 77 | 42.4 |
| Greece | 4 | 100 | 0.0 |
| Spain | 312 | 70 | 7.4 |
| France | 1 660 | 85 | 7.7 |
| Ireland | 5 | 100 | 0.0 |
| Italy | 665 | 88 | 8.1 |
| Luxembourg | 20 | 80 | 0.0 |
| Netherlands (1) | 456 | 90 | 24.1 |
| Portugal | 24 | 88 | 66.7 |

NB: See 'Notice to the reader' for comments on the comparability of data.
(1) Member States from which data only on faecal coliforms are available.

Table 4 contains general results for the last three bathing seasons. However, it is difficult to establish a trend because of the sharp increase in the number of points with inadequate sampling frequency.

This sharp increase is because the Commission paid special attention to the ways in which Member States were applying the option of reducing sampling frequency and in many cases irregularities were detected.

The number of bathing areas with inadequate sampling frequency is higher for inland water than for seawater, which seems contradictory since freshwater is usually of poorer quality.

### *Table 4* — Results for 1991, 1992 and 1993

(T = total number of sampling points; C (%) = percentage of all points identified complying with the mandatory values for total and faecal coliforms; C'(%) = percentage of points with required monitoring frequency and complying with the mandatory values for total and faecal coliforms; I (%) = percentage of points with inadequate sampling frequency)

| Year | T | C (%) | C' (%) | I (%) |
|---|---|---|---|---|
| 1991 | 4 824 | 70 | 82 | 9.1 |
| 1992 | 5 266 | 63 | 73 | 13.6 |
| 1993 | 5 041 | 66 | 83 | 20.9 |

# Directive 76/160/EEC – Annex

(OJ L 31, 5.2.1976)

The values specified in column I (mandatory) have been set as the minimum bathing water quality in the Member States.

*Quality requirements for bathing water*

| Parameters | G | I | Minimum sampling frequency | Method of analysis and inspection |
|---|---|---|---|---|
| **Microbiological:** | | | | |
| 1. Total coliforms/100 ml | 500 | 10 000 | Fortnightly (1) | Fermentation in multiple tubes. Subculturing of the positive tubes on a confirmation medium. Count according to MPN (most probable number) or membrane filtration and culture on an appropriate medium such as Tergitol lactose agar, endo-agar, 0.4% Teepol broth, subculturing and identification of the suspect colonies.<br><br>In the case of 1 and 2, the incubation temperature is variable according to whether total or faecal coliforms are being investigated. |
| 2. Faecal coliforms/100 ml | 100 | 2 000 | Fortnightly (1) | |
| 3. Faecal streptococci/100 ml | 100 | – | (2) | Litsky method. Count according to MPN (most probable number) or filtration on membrane. Culture on an appropriate medium. |
| 4. Salmonella/litre | – | 0 | (2) | Concentration by membrane filtration. Inoculation on a standard medium. Enrichment – subculturing on isolating agar – identification. |
| 5. Enteroviruses PFU/10 litres | – | 0 | (2) | Concentrating by filtration flocculation or centrifuging and confirmation. |
| **Physico-chemical:** | | | | |
| 6. pH | – | 6 to 9 (0) | (2) | Electrometry with calibration at pH 7 and 9. |

*Quality requirements for bathing water (continued)*

| Parameters | G | I | Minimum sampling frequency | Method of analysis and inspection |
|---|---|---|---|---|
| 7. Colour | – | No abnormal change in colour (0) | Fortnightly (1) | Visual inspection or photometry with standards on the Pt.Co scale. |
| | – | – | (2) | |
| 8. Mineral oils mg/litre | – | No film visible on the surface of the water and no odour | Fortnightly (1) | Visual and olfactory inspection or extraction using an adequate volume and weighing the dry residue. |
| | ≤ 0.3 | – | (2) | |
| 9. Surface-active substances reacting with methylene blue mg/l (lauryl sulphate) | – | No lasting foam | Fortnightly (1) | Visual inspection or absorption spectrophotometry with methylene blue. |
| | ≤ 0.3 | – | (2) | |
| 10. Phenols (phenol indices) mg/l $C_6H_5OH$ | – | No specific odour | Fortnightly (1) | Verification of the absence of specific odour due to phenol or absorption spectrophotometry 4-aminoantipyrine (4 AAP) method. |
| | ≤ 0.005 | ≤ 0.05 | (2) | |
| 11. Transparency m | 2 | 1 (0) | Fortnightly (1) | Secchi's disc. |
| 12. Dissolved oxygen % saturation $O_2$ | 80 to 120 | – | (2) | Winkler's method or electrometric method (oxygen meter). |
| 13. Tarry residues and floating materials such as wood, plastic articles, bottles, containers of glass, plastic, rubber or any other substance. Waste or splinters | Absence | | Fortnightly (1) | Visual inspection. |
| 14. Ammonia mg/litre $NH_4$ | | | (3) | Absorption spectrophotometry, Nessler's method, or indophenol blue method. |

*Quality requirements for bathing water (continued)*

| Parameters | G | I | Minimum sampling frequency | Method of analysis and inspection |
|---|---|---|---|---|
| 15. Nitrogen Kjeldahl mg/litre N | | | (3) | Kjeldahl method. |
| **Other substances regarded as indications of pollution:** | | | | |
| 16. Pesticides (parathion, HCH, dieldrin) mg/litre | | | (2) | Extraction with appropriate solvents and chromatographic determination. |
| 17. Heavy metals such as: | | | | |
| arsenic mg/litre As<br>cadmium Cd<br>chrome VI Cr VI<br>lead Pb<br>mercury Hg | | | (2) | Atomic absorption possibly preceded by extraction. |
| 18. Cyanides mg/litre Cn | | | (2) | Absorption spectrophotometry using a specific reagent. |
| 19. Nitrates and phosphates mg/litre $NO_3$ $PO_4$ | | | (2) | Absorption spectrophotometry using a specific reagent. |

G = guide.
I = mandatory.
(0) Provision exists for exceeding the limits in the event of exceptional geographical or meteorological conditions.
(1) When a sampling taken in previous years produced results which are appreciably better than those in this Annex and when no new factor likely to lower the quality of the water has appeared, the competent authorities may reduce the sampling frequency by a factor of 2.
(2) Concentration to be checked by the competent authorities when an inspection in the bathing area shows that the substance may be present or that the quality of the water has deteriorated.
(3) These parameters must be checked by the competent authorities when there is a tendency towards eutrophication of the water.

# Belgium

B

Belgium provided a report prepared jointly by the Institute for Hygiene and Epidemiology, the Ministry of the Walloon Region and the Flemish Environmental Agency.

The bathing season on the coast runs from 1 April to 30 September. However, for inland waters, the length of the season depends on the location, starting on 15 May or 1 July and ending on 31 August or 30 September.

Therefore a minimum of 13 samples must be taken at the coast, although this may be reduced to seven in bathing areas where the water quality has complied with the mandatory values in the previous two years. The minimum number of samples required for inland waters depends on the length of the bathing season.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive, which, in any case, are the same as the limit values laid down in Belgian legislation. The Directive sets only a guide value for faecal streptococci and floating materials. The results for these parameters were therefore assessed on the basis of these guide values.

A — *Seawater bathing areas*

A total of 39 sampling points are monitored on the coast.

***Table 1* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 39 | 0 | 39 | 1 |
| Faecal coliforms | 39 | 4 | 39 | 7 |
| Faecal streptococci (1) | 39 | 20 | 39 | 24 |
| Salmonella | 35 | 25 | 32 | 29 |
| Enteroviruses | 0 | — | 0 | — |

*Table 1 (continued)*

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Physico-chemical** | | | | |
| pH | – | – | – | – |
| Colour | 39 | 0 | 39 | 0 |
| Mineral oils | 39 | 0 | 39 | 0 |
| Surface-active substances | 39 | 0 | 39 | 0 |
| Phenols | 39 | 0 | 39 | 0 |
| Transparency | 0 | – | – | – |
| Floating materials (1) | 39 | 0 | 39 | 0 |

(1) Guide value only.

As in previous years, bathing water at the coast was closely monitored. An average of 44 samples was recorded during the bathing season, which means that one or more samples were taken every week.

In 1993, 32 (82%) of the areas sampled complied with the mandatory values laid down for total and faecal coliforms. This represents a reduction in the rate of compliance of approximately 8%. Nevertheless, it should be pointed out that as the number of bathing areas identified is relatively small, a change in compliance of only a few areas will have a significant effect on the final results.

Reference to the figures for 1991 and 1992 shows that three sampling points have failed to comply with the limit values for three consecutive years, indicating a recurrent pollution problem in these areas. It should also be pointed out that these bathing areas are close to harbours.

On the other hand, for the 1993 season, nine sampling points (23%) complied with the guide values for total and faecal coliforms. Salmonella tests proved positive in only one of these areas.

Salmonella tests are in fact carried out at virtually all bathing areas, although the Belgian authorities see no need to monitor for enteroviruses.

Faecal streptococci were monitored systematically. However, the Annex to the Directive sets only a guide value for this parameter which explains why only 39% of bathing areas complied with this standard.

As regards the physico-chemical parameters, the results complied with the requirements of the Directive. Because of the geographical conditions, the competent authorities took no account of transparency for assessing bathing water quality at the coast. However, ammonia concentration as well as the nitrate and phosphate content were regularly analysed.

## B – *Freshwater bathing areas*

Although the number of freshwater bathing areas appeared to remain the same, two areas in Flanders were withdrawn from the 1993 monitoring programme. Of the sampling points, 27 are on rivers and 58 are on lakes and ponds.

***Table 2* – Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 82 | 31 | 78 | 26 |
| Faecal coliforms | 82 | 30 | 78 | 27 |
| Faecal streptococci (1) | 82 | 66 | 83 | 50 |
| Salmonella | 82 | 13 | 63 | 13 |
| Enteroviruses | – | – | – | – |
| **Physico-chemical** | | | | |
| pH | 82 | 32 | 83 | 28 |
| Colour | 40 | 4 | 38 | 0 |
| Mineral oils | 78 | 7 | 72 | 7 |
| Surface-active substances | 78 | 22 | 71 | 14 |
| Phenols | 78 | 0 | 72 | 4 |
| Transparency | 40 | 29 | 38 | 35 |
| Floating materials (1) | 77 | 12 | 72 | 1 |

(1) Guide value only.

Of the areas sampled at the required frequency (78), 64% complied with the mandatory values for total and faecal coliforms. This was equivalent to 59% of all the 85 identified bathing areas.

Reference to the figures for 1991 and 1992 shows that seven sampling points, i.e. some 8% of bathing areas, failed to comply with the limit values for three consecutive years, indicating a recurrent pollution problem in these areas. With the exception of one sampling point on Lake Claire Fontaine, all the points with recurrent pollution problems are in rivers. In addition, bathing was prohibited in two places.

For the 1993 bathing season, 26 (31%) of the areas sampled, most of them in Flanders, complied with the guide values for total and faecal coliforms. No salmonella was detected at 24 of these sampling points.

Although tests for salmonella were widely carried out, the Belgian authorities did not consider it necessary to monitor for enteroviruses.

The Belgian authorities monitored for faecal streptococci systematically. However, the Annex to the Directive sets only a guide value for this parameter, which explains why only 40% of bathing areas complied with the standard.

As regards the physico-chemical parameters, the pH and transparency standards were regularly exceeded. Also, the dissolved oxygen concentrations revealed eutrophication of the freshwater bathing areas.

Very small quantities of foam are frequently observed on rivers in tourist areas of Wallonia. However, this does not always indicate detergent pollution since decomposing organic matter can also cause foaming. In any case, the Belgian authorities attribute the pollution generally to domestic waste from various scattered sources, which makes the problem difficult to solve.

## 2. General information

*Public information*

In coastal zones the local authorities published the results of analyses every week. The data are also available on videotext.

In internal zones, information on bathing water quality was published every two weeks.

*Improvement schemes*

As in 1993, ECU 87 million is to be invested in improvement schemes in urban areas in Wallonia, some of which are beside rivers used by tourists. It is to be hoped that in the medium to long term their water quality will improve.

Along the coast, the initial stages of improvement plans have been completed. The benefits should be perceptible in the 1994 bathing season.

## 3. Maps

Map 1 shows the results of the 1993 bathing season for Belgium.

It indicates for each commune the compliance of the bathing zones with the mandatory (I) values for total and faecal coliforms.

The method of analysis used for these two parameters was membrane filtration with subculture on an appropriate medium. The analysis was generally followed by a confirmation test.

***Table 3* – Summary of the information given on the map**

(compliance of bathing areas with standards for microbiological parameters – coliforms – 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 39 | 85 |
| Number of points with inadequate sampling frequency | 0 | 5 |
| Number of points complying with mandatory (I) values | 32 | 50 |
| Number of points where bathing was prohibited | 0 | 2 |
| Average sampling frequency | 44.8 | 9.1 |

## 4. Conclusion

At the coast, the number of areas complying slightly decreased during the 1993 bathing season.

For inland water, on the other hand, there was a slight increase in the number of waters complying although the number is still generally low, mainly because of rivers where limit values are frequently exceeded. Efforts to clean up the effluent from neighbouring towns should help to solve the river pollution problem.

# Denmark

DK

Denmark provided a report prepared by the Danish Environmental Protection Agency.

Under the current legislation, the bathing season runs from 1 June to 1 October. Sampling generally begins one month before the start of the bathing season.

In accordance with the Directive, a minimum of nine samples must therefore be taken, although this may be reduced to five in bathing areas where the water has complied with the mandatory values for the previous two years.

In practice, 10 samples are taken during the bathing season. The sampling frequency can be doubled if there are problems or if the limit values are exceeded. Where the water is known to be of very high quality, the number of samples can be reduced to five.

In certain areas where bathing continues in the winter, it is recommended that sampling should also continue throughout the winter.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive, except for the following parameters, for which Danish legislation has laid down the following stricter values:

faecal coliforms: 1 000/100 ml,

chemicals: absence.

It is probable that a different assessment of water quality in certain bathing areas would have been made if the mandatory value for faecal coliforms set in the Directive (which is less stringent than the national standard) had been taken as the reference value.

Moreover, the Danish authorities use a statistical tool not provided for in the Directive to estimate bathing water quality. This too could produce diverging assessments. Bathing waters which fail to meet the criteria are classified as doubtful. In some cases bathing may be prohibited.

### A — *Seawater bathing areas*

The number of coastal bathing areas increased by seven compared with 1992. However, the locations of certain sampling points have been changed: in 1992

monitoring was abandoned at 54 sampling points, while in 1993 results were no longer communicated for 31 sampling points.

The local authorities decide on the location of sampling points after consulting the regional council and the health council.

The Danish authorities do not measure total coliforms in seawaters. Research and experience have shown that the limit values for total coliforms are hardly ever exceeded in salt waters which meet the mandatory values set for faecal coliforms in the Directive. The Danish authorities consider that this complies with Article 4(2) of Directive 76/160/EEC, which requires the Member States to ensure that the values laid down in the Annex to the Directive are observed.

However, the total coliform parameter was measured in 27% of bathing areas in order to comply with the criteria laid down by the Foundation for Environmental Education in Europe (FEEE) for awarding a blue flag.

***Table 1* – Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 6 | 0 | 315 | 10 |
| Faecal coliforms | 1 146 | 33 | 1 160 | 25 |
| Faecal streptococci (1) | 226 | 38 | 333 | 53 |
| Salmonella | 0 | – | 0 | – |
| Enteroviruses | 0 | – | 0 | – |
| **Physico-chemical** | | | | |
| pH | – | – | – | – |
| Colour | 1 146 | 0 | 1 141 | 5 |
| Mineral oils | 1 146 | 0 | 1 141 | 0 |
| Surface-active substances | 1 146 | 0 | 1 141 | 1 |
| Phenols | 1 146 | 0 | 1 141 | 0 |
| Transparency | – | – | – | – |
| Floating materials (1) | – | – | – | – |

(1) Guide value only.

During the 1993 bathing season, 96% of the sampling points complied with the mandatory value for faecal coliforms. These results are comparable with those of previous years and confirm the very high quality of bathing water.

Since 1991 there seems to have been an improving trend in the quality of bathing water probably as a result of improvements in sewage treatment systems and storm basins. Discharges of untreated effluent have been substantially reduced.

Where the water has failed to meet the mandatory standards for three consecutive years, the local authorities have prohibited bathing. Bathing can also be prohibited in areas with unacceptable hygiene conditions. During 1993, bathing was prohibited in 20 areas, i.e. 1.7% of coastal bathing areas.

On the basis of the Danish standards which include a statistical evaluation, 57 bathing areas failed to meet the quality criteria. This is an improvement over the 1992 bathing season, during which 84 sampling points failed to meet the quality criteria.

Moreover, for the 1993 season, 87% of the sampling points also complied with the guide value for faecal coliforms. Denmark saw no need to monitor for salmonella or enteroviruses.

Faecal streptococci analyses were carried out in 28% of bathing areas for the purposes of the blue flag campaign. In all, 84% of bathing areas complied with this standard, for which the Directive sets only a guide value.

The limit values for physico-chemical parameters were exceeded in a very limited number of cases.

B – *Freshwater bathing areas*

The number of inland bathing areas remained unchanged compared with previous years.

***Table 2* – Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 106 | 2 | 105 | 0 |
| Faecal coliforms | 105 | 5 | 105 | 2 |
| Faecal streptococci (1) | 9 | 1 | 12 | 0 |
| Salmonella | 0 | – | 0 | – |
| Enteroviruses | 0 | – | 0 | – |

*Table 2 (continued)*

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Physico-chemical** | | | | |
| pH | – | – | – | – |
| Colour | 106 | 0 | 103 | 0 |
| Mineral oils | 106 | 0 | 103 | 0 |
| Surface-active substances | 106 | 0 | 103 | 0 |
| Phenols | 106 | 0 | 103 | 0 |
| Transparency | – | – | – | – |
| Floating materials (1) | – | – | – | – |

(1) Guide value only.

During the 1993 bathing season, 95% of the sampling points complied with the mandatory values for total and faecal coliforms. This confirms the improvement noted in 1992.

As in 1992, bathing was prohibited at three bathing areas because of recurrent pollution.

Moreover, for the 1993 bathing season, 78% of the sampling points also complied with the guide values set for these two parameters in the Directive. Denmark saw no need to monitor for salmonella or enteroviruses.

No results exceeding the limit values for the physico-chemical parameters were reported.

## 2. General information

*Public information*

Each year the Danish authorities publish a report containing the results for the previous bathing season together with a detailed map.

*Improvement schemes*

In areas where bathing is prohibited, the local authorities endeavour to identify the causes of the pollution. Improvements are made or measures are taken to reduce effluent from overflow installations.

At local level, efforts are made to detect and eliminate diffuse pollution sources such as illegal discharges from private properties, leakage from the sewerage system or pollution caused by slurry.

In 1987, the Danish Parliament adopted the aquatic environment action programme. Although not specifically targeted at bathing areas, it will result indirectly in an improvement in bathing water quality. A substantial proportion of the measures to be taken to reduce pollution will be aimed at improving discharge systems and sewage treatment plants. This will reduce discharges of untreated effluent with the consequence of improving the quality of bathing water.

## 3. Maps

Map 2 shows the results for the 1993 bathing season in Denmark.

It indicates for each commune the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for faecal coliforms in the case of coastal waters and for total and faecal coliforms in the case of freshwater bathing areas.

The method of analysis used for these parameters was membrane filtration with subculture on an appropriate medium (ISO/DIS 9308/1).

***Table 3* — Summary of the information given on the map**

(compliance of bathing areas with standards for microbiological parameters — coliforms — 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 1 180 | 108 |
| Number of points with inadequate sampling frequency | 2 | 0 |
| Number of points complying with mandatory (I) values | 1 135 | 103 |
| Number of points where bathing was prohibited | 20 | 3 |
| Average sampling frequency | 12.0 | 10.0 |

## 4. Conclusion

The results recorded during the 1993 bathing season confirm the very high quality of Danish bathing water. Water quality has tended to improve since 1991, largely as a result of a reduction in discharges of untreated effluent into the aquatic environment.

The reduction in the number of areas in which bathing was prohibited bears witness to the technical improvements made to waste-water treatment systems.

# Germany

D

Germany provided, for the 1993 bathing season, a report prepared by the competent national authorities.

Although the new *Länder* were not required to apply Directive 76/160/EEC until 1993, Mecklenburg-West Pomerania has been submitting data on the quality of its bathing water on a voluntary basis since 1991. This year Saxony-Anhalt, Berlin and Thuringia also submitted data for the first time.

The bathing season varies from one *Land* to another and sometimes between different parts of the same *Land* (between two and six months). In coastal areas, the bathing season is generally four months.

A minimum of nine samples must therefore be taken in these areas, although this may be reduced to five where the water met the mandatory standards during the previous two years.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive, except for faecal streptococci and floating materials, for which the guide values were used (the Directive lays down no mandatory values for these parameters).

### A — *Seawater bathing areas*

Results were reported for 445 bathing areas. This is slightly fewer than in 1992.

***Table 1* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 419 | 63 | 399 | 44 |
| Faecal coliforms | 419 | 55 | 402 | 43 |
| Faecal streptococci (1) | 31 | 3 | 11 | 3 |
| Salmonella | 2 | 0 | 2 | 0 |
| Enteroviruses | 2 | 2 | 0 | – |

*Table 1 (continued)*

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Physico-chemical** | | | | |
| pH | 296 | 12 | 353 | 18 |
| Colour | 415 | 56 | 393 | 30 |
| Mineral oils | 419 | 3 | 394 | 1 |
| Surface-active substances | 419 | 14 | 393 | 3 |
| Phenols | 265 | 1 | 394 | 2 |
| Transparency | 202 | 99 | 367 | 156 |
| Floating materials (1) | 264 | 0 | 393 | 81 |

(1) Guide value only.

In all, 333 (82%) of the 404 points sampled at the minimum frequency required by the Directive complied with the mandatory values set for total and faecal coliforms. This was equivalent to 76% of all the 436 identified bathing areas.

The abovementioned results only concern the three *Länder* with coastal bathing areas: Mecklenburg-West Pomerania, Schleswig-Holstein and Lower Saxony.

Reference to the figures for 1991 and 1992 shows that three sampling points failed to meet the limit values for three consecutive years. These results appear to show that there are few recurrent pollution problems affecting bathing areas.

Bathing was prohibited temporarily at a few areas, but fewer than in previous years.

For the 1993 bathing season, the guide values for total and faecal coliforms were met at 266 (61%) of the sampling points. There was no monitoring for enteroviruses, but salmonella was monitored in two bathing areas. Analyses for faecal streptococci were carried out in 2% of bathing areas.

As regards the physico-chemical parameters, the limit values for mineral oils, surface-active substances and phenols were seldom exceeded. The problems of colour and transparency generally resulted from the geographical conditions of the marine environment.

B — *Freshwater bathing areas*

In 1993, 1 702 bathing areas were monitored. This is 139 (about 8%) fewer than in 1992.

This decrease is due to a change in the degree of use of some bathing areas which, as a consequence, were no longer considered by the German authorities to come under the scope of Article 1 of Directive 76/160/EEC.

***Table 2* – Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 1 137 | 340 | 989 | 163 |
| Faecal coliforms | 1 179 | 174 | 1 018 | 92 |
| Faecal streptococci (1) | 210 | 14 | 162 | 46 |
| Salmonella | 591 | 40 | 491 | 22 |
| Enteroviruses | 110 | 70 | 50 | 1 |
| **Physico-chemical** | | | | |
| pH | 1 378 | 196 | 1 398 | 178 |
| Colour | 1 041 | 96 | 903 | 75 |
| Mineral oils | 1 066 | 2 | 939 | 0 |
| Surface-active substances | 1 063 | 27 | 917 | 56 |
| Phenols | 846 | 0 | 923 | 0 |
| Transparency | 844 | 414 | 814 | 320 |
| Floating materials (1) | 748 | 8 | 677 | 5 |

(1) Guide value only.

In all, 758 (77%) of the 981 areas sampled at the minimum frequency laid down in the Directive complied with the limit values for total and faecal coliforms. This was equivalent to 46% of all the 1 702 identified bathing areas.

The percentage of areas where the frequency of sampling was inadequate rose sharply from 28% in 1992 to 42% in 1993. This is because, for the last two years, the Commission has looked more closely at the conditions for reduced sampling frequency. Control measures were carried out effectively for the first time this year.

Reference to the figures for 1991 and 1992 shows that 46 sampling points failed to meet the limit values for three consecutive years, indicating a recurrent pollution problem in about 3% of the bathing areas sampled with the required frequency.

Bathing was prohibited at 23 bathing areas following the growth of blue-green algae.

For the 1993 bathing season, the guide values for total and faecal coliforms were met in 30% of bathing areas. Salmonella was monitored at 29% of bathing areas, whereas enteroviruses were monitored at only 3% of bathing areas. Analyses for faecal streptococci were carried out at about 9% of bathing areas.

As regards the physico-chemical parameters, the limit values most often exceeded were pH, transparency and dissolved oxygen, often as a result of the development of algae.

## 2. General information

*Public information*

The German authorities publish information on the most recent results close to the bathing areas.

*Improvement schemes*

The sanitation measures carried out by the German authorities include the construction and extension of sewage treatment plants, management of the river banks in order to reduce the quantity of agricultural effluents reaching bathing waters and the implementation of programmes for the sustainable management of slurry.

Moreover, actions were taken in order to develop the self-cleansing process of rivers. In addition, incentives for developing high technology ensuring optimal functioning of small purification plants were provided by the German authorities.

These measures resulted in a striking improvement in water quality in freshwater bathing areas: the compliance rate improved spectacularly from 54% of areas sampled at the required frequency in 1992 to 77% in 1993.

The follow-up of these measures should in the future lead to the improvement of bathing water quality.

*Scientific research*

The Kiel Health Institute carried out research into the value of total coliforms as an indicator of the level of pollution of bathing water. The methods of analysis used also revealed the presence of other bacteria, including aeromonas. This bacteria constitutes a threat to public health where more than 10 000 colonies are present. Temporary bathing bans were established on these grounds in 1993.

## 3. Maps

Maps 3 and 4 show the results recorded in northern and southern Germany during the 1993 bathing season.

They indicate for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The methods of analysis used for these two parameters are described in the Annex to the Directive. Depending on the laboratory, either the membrane filtration method with subculture on an appropriate medium or fermentation in multiple tubes was used.

***Table 3* – Summary of the information given on the maps**

(compliance of bathing areas with standards for microbiological parameters – coliforms – 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 436 | 1 702 |
| Number of points with inadequate sampling frequency | 32 | 721 |
| Number of points complying with mandatory (I) values | 333 | 758 |
| Number of points where bathing was prohibited | 5 | 23 |
| Average sampling frequency | 12.0 | 8.5 |

## 4. Conclusion

In coastal bathing areas, an improvement in water quality was recorded in 1993.

In freshwater bathing areas, water quality improved spectacularly: from 57% in 1991 and 54% in 1992, the compliance rate soared to 77% in 1993. However, since the frequency of sampling was insufficient in 42% of bathing areas, it is difficult to draw definitive conclusions regarding the improvement of water quality in freshwater bathing areas.

# Greece

GR

In accordance with Directive 76/160/EEC, bathing water quality was monitored systematically throughout the 1993 bathing season as part of the programme prepared by the Ministry of the Environment, Planning and Public Works.

The bathing season generally runs from May to October. It varies between five and six months, depending on the geographical location and climate of the areas concerned. The season started later in 1993 because of bad weather.

The minimum number of samples which must be taken varies between 11 and 13, although the number may be reduced to six or seven in bathing areas where the water quality has complied with the mandatory values for the previous two years.

The location of the sampling points in the bathing areas corresponding to the definition in the Directive is chosen by the competent ministry.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive. However, Greek legislation lays down stricter standards for two parameters:

faecal coliforms: 500/100 ml,

transparency: 2 m.

Consequently, a different assessment of bathing water quality in certain areas would probably be made if the mandatory value set in the Directive for faecal coliforms (which is less stringent than the national value) was taken as the reference value.

The Directive sets only a guide value for faecal streptococci and floating materials. The results for these two parameters were therefore assessed on the basis of this standard.

### A — *Seawater bathing areas*

During the 1993 bathing season, 1 250 bathing areas were monitored. After a considerable increase in the number of areas monitored in 1991, when 411 sampling points were added to the programme, there has been a constant increase in the number of areas, with 47 new areas being added in 1993.

Nevertheless, it seems that the locations of the sampling points are not stable; although new points have been included in the monitoring programme, other points which were monitored in previous years have been withdrawn.

Some 56 sampling points were withdrawn in 1991 while results were not reported for 58 points in 1992 and for 35 points in 1993.

These changes are the consequence of an increase in the degree of use of some new bathing areas which therefore have been included in the monitoring programme.

For other bathing areas, a decrease in the degree of use has consequently led to these areas no longer being considered by the Greek authorities to come under the scope of Article 1 of Directive 76/160/EEC. Local authorities and the central administration have agreed on these modifications.

However, the Greek authorities intend to maintain the location of the sampling points included in the monitoring programme for the quality of bathing waters.

***Table 1* – Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 1 197 | 13 | 1 240 | 22 |
| Faecal coliforms | 1 197 | 28 | 1 240 | 38 |
| Faecal streptococci (1) | 1 197 | 38 | 1 250 | 4 |
| Salmonella | 0 | – | 0 | – |
| Enteroviruses | 0 | – | 0 | – |
| **Physico-chemical** | | | | |
| pH | – | – | – | – |
| Colour | 1 197 | 12 | 1 240 | 0 |
| Mineral oils | 1 197 | 3 | 1 240 | 1 |
| Surface-active substances | 1 197 | 6 | 1 240 | 4 |
| Phenols | 1 197 | 6 | 1 240 | 0 |
| Transparency | 0 | – | – | – |
| Floating materials (1) | 1 197 | 4 | 1 239 | 4 |

(1) Guide value only.

Some 97% of the 1 240 areas sampled at the frequency required by the Directive complied with the mandatory values set for total coliforms and faecal coliforms. If all the identified bathing areas are taken into consideration, the figure is approximately 0.7% lower.

Reference to the figures for 1991 and 1992 shows that three sampling points have not complied with limit values for three consecutive years, indicating that there are few recurrent pollution problems affecting bathing areas.

For the 1993 bathing season, some 1 170 sampling points (94%) complied with the guide values for total and faecal coliforms. Greece saw no need to monitor for salmonella and enteroviruses.

The Greek authorities carried out analyses for faecal streptococci at all their bathing areas and, with the exception of four, all areas complied with the guide values.

The values set in the Directive for the physico-chemical parameters were met in most cases. These parameters are usually detected by sight or smell, although in some cases the authorities did use analytical methods.

B — *Freshwater bathing areas*

Since Greece has few large rivers or lakes, inland bathing is rare. Only two lakes contain identified bathing areas.

***Table 2* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 4 | 0 | 4 | 0 |
| Faecal coliforms | 4 | 0 | 4 | 0 |
| Faecal streptococci (1) | 4 | 0 | 4 | 0 |
| Salmonella | 0 | – | 0 | – |
| Enteroviruses | 0 | – | 0 | – |
| **Physico-chemical** | | | | |
| pH | – | – | – | – |
| Colour | 4 | 0 | 4 | 0 |
| Mineral oils | 4 | 0 | 4 | 0 |
| Surface-active substances | 4 | 0 | 4 | 0 |
| Phenols | 4 | 0 | 4 | 0 |
| Transparency | 0 | – | 0 | – |
| Floating materials (1) | 4 | 0 | 4 | 0 |

(1) Guide value only.

As in previous years, the results of the analyses at all four of these areas were in line with the values set by the Directive.

## 2. General information

*Public information*

Information related to the monitoring programme on bathing water quality is available to the public by a telephone service in the regional laboratories, the local administrations and the central authorities of the Ministry of the Environment.

The environment ministry is in permanent contact with the laboratories which participate in the network set up for the monitoring of bathing waters. All the data are transmitted to the coordination unit for inclusion in a database.

*Improvement schemes*

Evaluation of results over several bathing seasons shows that pollution continues to occur at the same places.

In the region of Attiki, which is permanently polluted, the completion of a water treatment plant for the Athens conurbation should improve the quality of water in the Saronic Gulf. This plant is being financed from the Community's Structural Funds.

In other areas with specific cases of pollution, more limited measures are envisaged. Plans have been made to carry out studies in these areas to determine the exact causes of pollution and to estimate the cost of remedial action.

## 3. Maps

Map 5 shows the results for the 1993 bathing season in Greece.

It indicates for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The methods used to analyse these two parameters are those specified in the Directive, namely lactose fermentation in multiple tubes followed by a confirmation test, or membrane filtration with subculture on an appropriate medium and identification of the suspect colonies.

***Table 3* — Summary of the information given on the map**

(compliance of bathing areas with the standards for microbiological parameters — coliforms — 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 1 250 | 4 |
| Number of points with inadequate sampling frequency | 10 | 0 |
| Number of points complying with mandatory (I) values | 1 201 | 4 |
| Number of points where bathing was prohibited | 0 | 0 |
| Average sampling frequency | 14.0 | 13.0 |

## 4. Conclusion

The results recorded in 1993 once again confirmed the excellent quality of the bathing water.

The completion of treatment plants financed from the Community Structural Funds should, in the next few years, solve the problems faced by those areas where there have been repeated reports of pollution.

# Spain

ES

Spain provided a report prepared by the Ministry of Health and Consumer Affairs.

The length of the bathing season is decided by each autonomous region and depends on geographical factors, climate and tourism. It varies between three and five months at the coast and between one-and-a-half months and four-and-a-half months for inland waters.

The minimum number of samples which must be taken therefore varies between 7 and 11 at the coast and between 4 and 10 inland.

In practice, between 9 and 40 samples are usually taken at the coast and between 5 and 20 for inland waters.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive, which are the same as the limit values set in Spanish legislation, except for faecal streptococci and floating materials, for which the guide values were used (the Directive lays down no mandatory values for these parameters).

The Spanish authorities classify bathing water into three quality categories:

Category 2: water complying with the mandatory values and guide values for every parameter measured or assessed;

Category 1: water complying with the mandatory values for every parameter measured or assessed;

Category 0: water not complying with the mandatory values for one or more of the parameters measured or assessed.

### A — *Seawater bathing areas*

In 1993, 1 405 coastal bathing areas were monitored. This is 70 (5.2%) more than in 1992.

While the number of areas monitored has increased substantially since 1991, the location of certain sampling points also appears to have changed. For administrative reasons, new sampling points have been added, while points monitored in earlier years have been withdrawn from the monitoring programme.

The submission of data ceased for 39 sampling points in 1991, 23 in 1992 and 4 in 1993.

***Table 1* – Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 1 335 | 67 | 1 399 | 37 |
| Faecal coliforms | 1 335 | 93 | 1 399 | 54 |
| Faecal streptococci (1) | 1 178 | 435 | 1 399 | 308 |
| Salmonella | 546 | 21 | 640 | 15 |
| Enteroviruses | 1 | 0 | 85 | 0 |
| **Physico-chemical** | | | | |
| pH | 1 258 | 4 | 1 330 | 0 |
| Colour | 1 335 | 25 | 1 399 | 18 |
| Mineral oils | 1 335 | 10 | 1 399 | 4 |
| Surface-active substances | 1 335 | 26 | 1 399 | 14 |
| Phenols | 1 335 | 13 | 1 399 | 9 |
| Transparency | 1 335 | 16 | 1 399 | 13 |
| Floating materials (1) | 1 335 | 172 | 1 399 | 36 |

(1) Guide value only.

In 1993, 96% of the areas sampled complied with the mandatory values for total and faecal coliforms.

Reference to the figures for 1991 and 1992 shows that 32 sampling points (about 2.3% of bathing areas) failed to meet the limit values for three consecutive years, indicating a recurrent pollution problem in certain areas.

For the 1993 bathing season, the guides values were met by 80% of bathing areas. The presence of salmonella was not recorded in any of these areas.

Analyses for salmonella were carried out at 46% of the sampling points and enteroviruses were monitored at 6% of the bathing areas.

Analyses for faecal streptococci were carried out systematically. At 78% of the sampling points, the results were in compliance with the guide value set in the Directive.

As regards the physico-chemical parameters, 1 380 (98%) of bathing areas complied with the limits set for mineral oils, surface-active substances and phenols.

According to the Spanish classification, 25 and 71% respectively were classified as categories 2 and 1.

B – *Freshwater bathing areas*

The number of inland bathing areas monitored has increased substantially (by 15%) since 1991.

The locations of certain sampling points have also changed. For administrative reasons, new sampling points have been added, while points monitored in earlier years have been withdrawn from the monitoring programme.

The transmission of data ceased for nine sampling points in 1991, 12 in 1992 and six in 1993.

***Table 2* – Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 294 | 87 | 289 | 70 |
| Faecal coliforms | 294 | 96 | 289 | 72 |
| Faecal streptococci (1) | 204 | 132 | 209 | 109 |
| Salmonella | 174 | 19 | 138 | 16 |
| Enteroviruses | 44 | 0 | 19 | 0 |
| **Physico-chemical** | | | | |
| pH | 253 | 9 | 259 | 3 |
| Colour | 294 | 27 | 289 | 20 |
| Mineral oils | 294 | 2 | 289 | 4 |
| Surface-active substances | 294 | 10 | 289 | 8 |
| Phenols | 294 | 2 | 289 | 4 |
| Transparency | 294 | 39 | 289 | 14 |
| Floating materials (1) | 209 | 10 | 256 | 13 |

(1) Guide value only.

In all, 203 (70%) of the 289 points sampled at the required frequency complied with the mandatory values for total and faecal coliforms. This is equivalent to 65% of all identified bathing areas.

Reference to the figures for 1991 and 1992 shows that 59 sampling points (about 7.7% of bathing areas) failed to meet the limit values for three consecutive years, indicating recurrent pollution problems in these areas.

For the 1993 bathing season, the guide values were met by 28% of bathing areas. Salmonella was detected at one bathing area.

Analyses for salmonella were carried on at 44% of sampling points and enteroviruses were monitored at 6% of bathing areas.

As regards the physico-chemical parameters, 276 (95%) of the 289 areas sampled at the required frequency complied with the limits set for mineral oils, surface-active substances and phenols.

According to the Spanish classification, 22 and 43% respectively were classified as categories 2 and 1.

## 2. General information

*Public information*

The Ministry of Health and Consumer Affairs publishes, on the basis of data provided by the autonomous communities, a detailed annual report on the quality of bathing water at a national level. This report is then made available to the press.

During the bathing season, local and autonomous authorities display information on the most recent results on posters close to the bathing areas. There is also information published in the press or available by telephone.

*Improvement schemes*

The Spanish authorities have identified the discharges which could impair water quality in each bathing area. Improvement plans have been set by the competent regional authorities.

## 3. Maps

Map 6 shows the results for the 1993 bathing season in Spain.

It indicates for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The methods of analysis used for these two parameters are described in the Annex to the Directive. Depending on the laboratory, either membrane filtration with subculture on an appropriate medium, or fermentation in multiple tubes was used.

***Table 3* – Summary of the information given on the map**

(compliance of bathing areas with standards for microbiological parameters – coliforms – 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 1 405 | 312 |
| Number of points with inadequate sampling frequency or not monitored | 6 | 23 |
| Number of points complying with mandatory (I) values | 1 341 | 202 |
| Number of points where bathing was prohibited | 0 | 0 |
| Average sampling frequency | 13.8 | 7.2 |

## 4. Conclusion

The quality of coastal bathing waters has improved substantially over the last three years. The compliance rate in areas sampled at the required frequency rose from 89% in 1991 to 96% in 1993.

For inland waters, the compliance rate has slightly decreased in comparison with 1992. This seems to be the consequence of a prolonged period of drought.

It should, however, be emphasized that for both inland and coastal waters the number of bathing areas monitored has increased substantially since 1991.

# France

F

Monitoring of bathing water quality is organized by the Ministry of Health (Directorate-General for Health, Water Department), which coordinates the data submitted by the Department of Health and Social Affairs in each region. The Ministry also forwards the data for publication in the Commission's report.

The length of the bathing season varies throughout the French territory, except in Guadeloupe, French Guiana, Martinique, and Réunion, where it lasts all year. The bathing season is defined locally according to the degree of use of the zone.

In coastal areas, the length of the bathing season is more or less constant, generally lasting for three to four months.

For inland waters, on the other hand, the length of the bathing season can range from one to five months.

Using the extremes as a reference, the number of samples required varies between 3 and 21, or possibly between 2 and 11 in areas where the water quality has complied with the mandatory values for the previous two years.

The monitoring programme is organized at the beginning of the season by the Department of Health and Social Affairs in each region, in coordination with the Seawater Quality Units, the municipal authorities and the approved laboratories.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive, except for faecal streptococci and floating materials, for which the guide values were used (the Directive lays down no mandatory values for these parameters). Based on these limit values and on the percentages set in the Directive, the French authorities classify bathing water into four categories:

A: high quality,

B: moderate quality,

C: possibly temporarily polluted,

D: poor quality.

Bathing water in categories A and B complies with the limit values set by Directive 76/160/EEC. Water in category A also complies with the guide values for total coliforms, faecal coliforms and faecal streptococci.

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A — *Seawater bathing areas*

A total of 1 856 seawater bathing areas in France were monitored in 1993, 76 fewer than in 1992. In addition, several points were withdrawn from the monitoring programme while new points were added.

These changes in the identification of bathing waters are due to the re-evaluation of the monitoring programme. When the degree of use of a bathing water is not constant or insignificant and when bathing is prohibited for hygienic reasons, it is no longer considered by the French authorities to come under the scope of Article 1 of Directive 76/160/EEC. On the other hand, some new areas are monitored also as a consequence of a change in the degree of use.

These changes concerned 12 points in 1992 and 34 in 1993.

***Table 1* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 1 756 | 111 | 1 690 | 74 |
| Faecal coliforms | 1 756 | 225 | 1 690 | 146 |
| Faecal streptococci (1) | 1 884 | 700 | 1 848 | 544 |
| Salmonella | — | — | 88 | 0 |
| Enteroviruses | — | — | 0 | — |
| **Physico-chemical** | | | | |
| pH | 225 | 7 | 181 | 83 |
| Colour | 0 | — | 0 | — |
| Mineral oils | 1 618 | 26 | 26 | 0 |
| Surface-active substances | 1 618 | 137 | 0 | — |
| Phenols | 1 618 | 0 | 0 | — |
| Transparency | 0 | — | 124 | 56 |
| Floating materials (1) | 1 618 | 142 | 9 | 0 |

(1) Guide value only.

Of the 1 690 areas sampled at the frequency required by the Directive, 90% complied with the mandatory values for total and faecal coliforms. This is equivalent to 82% of all the 1 856 identified bathing areas.

Reference to the figures for 1991 and 1992 shows that 33 sampling points, or approximately 1.8% of the bathing areas, failed to comply with the limit values for three consecutive years, indicating that there are few recurrent sources of pollution affecting bathing areas.

For the 1993 bathing season, a total of 1 199 sampling points complied with the guide values for total and faecal coliforms, representing 65% of all bathing areas.

According to the French classification, some 58.4% of the areas sampled were classified as category A.

Monitoring for salmonella was carried out in only 5% of bathing areas.

The French authorities did not consider it necessary to monitor for enteroviruses.

Finally, the authorities carried out systematic analyses for faecal streptococci, for which there is only a guide value set in the Annex to the Directive; 70% of bathing areas complied with this standard.

Concerning the physico-chemical parameters, reorganization of the national computerized data system has delayed the processing of bathing water data and their transmission to the Commission.

B — *Freshwater bathing areas*

A total of 1 660 inland bathing areas in France were monitored in 1993, which is 94 fewer than in 1992. In addition, several points were withdrawn from the monitoring programme while new sampling points were added.

These changes in the identification of bathing waters are due to the re-evaluation of the monitoring programme. When the degree of use of a bathing water is not constant or insignificant and when bathing is prohibited for hygienic reasons, it is no longer considered by the French authorities to come under the scope of Article 1 of Directive 76/160/EEC. On the other hand, some new areas are monitored also as a consequence of a change in the degree of use.

These changes concern 281 points in 1992 and 85 points in 1993.

***Table 2* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 1 650 | 181 | 1 544 | 133 |
| Faecal coliforms | 1 650 | 248 | 1 535 | 197 |
| Faecal streptococci (1) | 1 671 | 945 | 1 611 | 849 |
| Salmonella | — | — | 101 | 5 |
| Enteroviruses | — | — | 4 | 1 |

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*Table 2 (continued)*

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Physico-chemical** | | | | |
| pH | 1 523 | 156 | 1 005 | 100 |
| Colour | 0 | – | 107 | 0 |
| Mineral oils | 1 541 | 14 | 66 | 0 |
| Surface-active substances | 1 541 | 123 | 19 | 0 |
| Phenols | 1 541 | 0 | 15 | 1 |
| Transparency | 0 | – | 183 | 70 |
| Floating materials (1) | 1 541 | 113 | 9 | 0 |

(1) Guide value only.

In the 1993 bathing season, 85% of the areas sampled at the required frequency complied with the mandatory values for total and faecal coliforms. This was equivalent to 79% of all the identified bathing areas.

Reference to the figures for 1991 and 1992 shows that 49 sampling points, or 3.0% of bathing areas, failed to comply with the limit values for three consecutive years, indicating that there are few recurrent sources of pollution affecting bathing areas.

For the 1993 bathing season, some 37% of freshwater bathing areas complied with the guide values. Monitoring of salmonella was carried out in 6% of bathing areas. There was virtually no monitoring of enteroviruses, with only four areas being sampled for this parameter.

According to the French classification, some 28% of the areas sampled were classified in category A.

Finally, the French authorities carried out systematic analyses for faecal streptococci, for which the Annex to the Directive only sets a guide value; 47% of bathing areas complied with this standard.

Concerning the physico-chemical parameters, reorganization of the national computerized data system has delayed the processing of bathing water data and their transmission to the Commission.

## 2. General information

*Public information*

The public is kept informed of the most recent results of analysis via the Minitel (3615) with the heading 'Infoplage'. Notices are also displayed at bathing places.

France is also working on wide-ranging information programmes on improvement schemes. In particular in built-up areas, the authorities publish a detailed report on schemes as part of an annual press campaign on bathing water quality.

*Improvement schemes*

Despite the progress of improvement schemes in France in recent years, local authorities still need to step up their efforts in order to improve water quality overall. The target set for the year 2000 is for a reliable collection system for urban waste water and improved performance of waste-water treatment plants in accordance with the requirements of Directive 91/271/EEC concerning urban waste-water treatment.

A new policy was heralded by the publication on 3 January 1992 of the Water Law and a set of implementing rules, which enabled Directive 91/271/EEC to be incorporated into national law.

Furthermore, in the context of the sixth assistance programme (1992-94), the water boards lend substantial assistance to the local authorities. Some ECU 7 billion, including ECU 900 million for coastal areas, will be used to subsidize improvement schemes operated by the local authorities.

*Scientific research*

As part of the work undertaken with the French Standardization Association on methods for microbiological analysis of bathing water, the Ministry of Social Affairs and Solidarity commissioned a study in 1988 to compare methods of analysis for coliforms and faecal streptococci in several laboratories.

Each laboratory conducted analyses on a series of samples using four different methods, including those laid down by the Directive.

The study showed that the results obtained for coliform analysis using membrane filtration and fermentation in a liquid medium were comparable.

In the case of faecal streptococci, there is a risk of interference which may result in false 'positive' results. During the 1989 season, a detailed study was carried out on bathing water in the Landes region, in particular by the Bordeaux laboratory. It emerged that in certain cases, depending on the ecosystem, tests for faecal streptococci were distorted by the presence of germs not indicative of faecal pollution, such as aerococci or staphylococci.

Tests were conducted to improve analytical methods for faecal streptococci. The results were presented to the Public Health Council on 22 May 1990, and a revised method has been in use since then.

Finally, the pilot project on the use of microplaques described in the 1992 report (EUR 15031) has been extended to a greater number of regions.

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*Pilot project*

At the request of the French authorities, the European Environment Agency (Task Force) has developed software for managing raw data relating to the quality of bathing water in France. This is designed to enable individual data concerning the different parameters of the Directive to be encoded, in the laboratory or by local authorities, and the results of analysis to be automatically converted into the format required by the Commission.

From the Commission's point of view, the chief value of developing such a tool was to test a system for exchanging raw data in the context of the setting-up of the European Environment Agency. Using data relating to bathing water quality in a broader context than the Commission's report on the application of the Directive, by correlating these data with those from other sources, formed part of the pilot project.

The possibilities for using these raw data were laid down in an agreement signed by the French authorities and the European Environment Agency (Task Force).

## 3. Maps

Maps 7 and 8, relating to seawater and freshwater respectively, show the results for the 1993 season.

They indicate for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The methods of analysis used for these two parameters were those laid down by the Directive. Depending on the laboratory, they were either membrane filtration with subculture on an appropriate medium and confirmation of colonies, or fermentation in multiple tubes. In some districts the microplaque method was used.

***Table 3* — Summary of the information given on the maps**

(compliance of bathing areas with the standards for microbiological parameters — coliforms — 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 1 856 | 1 660 |
| Number of points with inadequate sampling frequency | 166 | 127 |
| Number of points complying with mandatory (I) values | 1 526 | 1 306 |
| Number of points where bathing was prohibited | 0 | 0 |
| Average sampling frequency | 11.2 | 6.0 |

## 4. Conclusion

For coastal areas, the compliance rate has slightly increased in comparison with the 1992 bathing season.

The situation is similar for inland bathing areas.

During the last season, a decrease of about 5% of the identified bathing waters was recorded as a consequence of a re-evaluation of the monitoring programme.

# Ireland

IRL

Ireland provided a report on the 1993 bathing season prepared by the Department of the Environment.

The bathing season runs from 1 June to 31 August.

The minimum number of samples which must be taken is therefore seven, although this may be reduced to four in bathing areas where the water quality has complied with the mandatory values for the previous two years.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive. However, Irish legislation has set more stringent standards for the following parameters:

total coliforms: 5 000/100 ml,

faecal coliforms: 1 000/100 ml,

faecal streptococci: 300/100 ml,

dissolved oxygen: 70 to 120%.

Consequently, a different assessment of bathing water quality in certain areas would probably be made if the mandatory values laid down in the Directive (which are less stringent than the national standards) were taken as the reference values.

With regard to faecal streptococci and floating materials, the Directive provides only guide values; the results for these two parameters have been assessed in the light of these values.

### A — *Seawater bathing areas*

The number of bathing areas is the same as for 1992; monitoring was carried out at 90 sampling points (in 89 bathing areas).

IRL

*Table 1* — **Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 90 | 1 | 90 | 1 |
| Faecal coliforms | 90 | 5 | 90 | 4 |
| Faecal streptococci (1) | — | — | 89 | 5 |
| Salmonella | 16 | 0 | 16 | 1 |
| Enteroviruses | 1 | 0 | 1 | 0 |
| **Physico-chemical** | | | | |
| pH | 53 | 0 | 68 | 0 |
| Colour | 90 | 1 | 89 | 4 |
| Mineral oils | 90 | 0 | 89 | 0 |
| Surface-active substances | 90 | 0 | 89 | 0 |
| Phenols | 90 | 0 | 89 | 0 |
| Transparency | 84 | 4 | 79 | 5 |
| Floating materials (1) | — | — | 89 | 0 |

(1) Guide value only.

For the 1993 bathing season, 86 of the 90 points sampled (96%) complied with the mandatory values laid down for total and faecal coliforms in the Directive. This represents a slight improvement over last year's figure.

Two of the four sampling points which did not comply are in the Dublin area. Reference to previous years' statistics shows that these areas have not complied in the past either, indicating a recurrent pollution problem. However, water quality in this region should improve over the next few years as clean-up plans are put into action.

In the two other areas which failed to comply, only a single breach of the limit values was reported throughout the 1993 bathing season. This cannot be accounted for, particularly since these areas complied with the standards in 1992 and the factors affecting the bathing area have remained unchanged since then.

In addition, 76% of the sampling points complied with the guide values for total and faecal coliforms. This is a net decrease in comparison with 1992, when 86% of the sampling points complied with the guide values.

The fall in the level of excellence of water quality is confirmed by comparing the results with the standards set by Irish legislation. The compliance rate by national standards is 86% compared with 99% in 1992. The Irish authorities are unable to explain this deterioration, but point out that 1993 was a very wet summer and results in general were poorer. In addition, because of the statistically small number

of samples, a single breach can result in non-compliance even if the general trend over a period of time for a bathing area is good.

Tests for salmonella were carried out in 20% of bathing areas and it was found at only one of the sites. The Irish authorities undertook very little testing for enteroviruses, as inspection of the bathing areas did not show such substances to be present.

The Irish authorities carried out systematic tests on the numbers of faecal streptococci and found that 96% of the bathing areas complied with the Directive, which specifies a guide value only.

As in previous years, only a few marginal problems were reported as regards the physico-chemical parameters, in relation to colour and transparency, and these were identified as being of natural origin.

B — *Freshwater bathing areas*

Five inland bathing areas were identified in 1992. This figure remains unchanged in 1993.

***Table 2* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 5 | 0 | 5 | 0 |
| Faecal coliforms | 5 | 0 | 5 | 0 |
| Faecal streptococci (1) | — | — | 5 | 0 |
| Salmonella | 3 | 0 | 3 | 1 |
| Enteroviruses | 0 | — | 0 | — |
| **Physico-chemical** | | | | |
| pH | 5 | 0 | 5 | 0 |
| Colour | 5 | 0 | 5 | 1 |
| Mineral oils | 5 | 0 | 5 | 0 |
| Surface-active substances | 5 | 0 | 5 | 0 |
| Phenols | 5 | 0 | 5 | 0 |
| Transparency | 5 | 1 | 4 | 0 |
| Floating materials (1) | — | — | 2 | 0 |

(1) Guide value only.

All the inland bathing areas complied with the mandatory values laid down for total and faecal coliforms in the 1993 bathing season.

All these areas also complied with the guide values for these parameters.

Salmonella was found in one sample at Lough Owel. No explanation has been found for this, particularly since all further tests proved negative and other microbiological parameters were well within the limits for the sample.

The only breach of standards as regards the physico-chemical parameters, in relation to colour, was identified as being of natural origin.

## 2. General information

*Public information*

National legislation requires that local authorities publish the most recent statistics on bathing water quality at or near bathing areas.

A more detailed record of this information is available for public consultation in local authority offices.

Finally, national results are published regularly in a Department of the Environment bulletin, which is available free of charge to the public, nature conservation groups, etc.

*Improvement schemes*

Bathing water quality in Ireland is generally good. However, there are recurrent pollution problems in certain bathing zones in the Dublin area. This is because this area is highly populated, unlike the rest of Ireland.

To resolve this problem, the authorities intend to improve sewage treatment at Howth and Ringsend. The work should be finished by the year 2000, if sufficient funds are available.

Any such improvements will be undertaken in line with the objectives of the government's environment action programme for 1990 to 2000.

## 3. Maps

Map 9 shows the results for the 1993 bathing season in Ireland.

It indicates for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The method of analysis used for these two parameters was membrane filtration and culture on an appropriate medium.

***Table 3* – Summary of the information given on the map**

(compliance of bathing areas with the standards for microbiological parameters – coliforms – 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 90 | 5 |
| Number of points with inadequate sampling frequency | 0 | 0 |
| Number of points complying with mandatory (I) values | 86 | 5 |
| Number of points where bathing was prohibited | 0 | 0 |
| Average sampling frequency | 10.5 | 11.4 |

## 4. Conclusion

The quality of bathing water in Ireland is generally very good as it can be said that 96% of bathing areas comply with the standards laid down in the Directive. It should be pointed out that there has been a slight improvement in compliance rates for bathing areas in comparison with 1992.

# Italy

Italy provided a report prepared by the Ministry of Health based on figures provided by health and pollution-prevention laboratories and multiarea pollution-prevention agencies ('Presidi multizonali di prevenzione').

The bathing season runs from 1 May to 30 September with the exception of Sicily where it extends to 31 October.

Therefore, according to the Directive, the minimum number of samples which must be taken is 11 and 13 respectively. However, this may be reduced to six and seven respectively in bathing areas which have complied with the mandatory values for the previous two years.

Only the laboratories and pollution-prevention agencies in Tuscany, Abruzzi, Lazio, Apulia, Sicily and Sardinia opted for this lower sampling frequency, in accordance with Italian legislation (Presidential Decree No 470/82).

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive. However, Italian legislation sets stricter standards for the following parameters:

total coliforms: 2 000/100 ml,

faecal coliforms: 100/100 ml,

faecal streptococci: 100/100 ml,

dissolved oxygen: 70 to 120%,

mineral oils: $\leq$ 0.5 mg/l where determined by extraction,

surface-active substances: $\leq$ 0.5 mg/l where determined by spectrophotometry.

Consequently, a different assessment of bathing water quality in certain areas would probably be made if the mandatory values laid down in the Directive (which are less stringent than the national standards) were taken as the reference values.

### A — *Seawater bathing areas*

During the 1993 bathing season, 4 288 bathing areas were monitored, which is an increase of 255 areas. However, it seems that the Italian authorities regularly change the location of their sampling points so that, although new points were included in the monitoring programme, other points which had been monitored in

previous years were no longer included. Some 48 sampling points were withdrawn in 1991 while results were no longer notified for 220 points in 1992, and for 137 points in 1993.

***Table 1* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 4 000 | 218 | 4 017 | 148 |
| Faecal coliforms | 4 000 | 280 | 4 018 | 229 |
| Faecal streptococci (1) | 4 033 | 343 | 4 288 | 324 |
| Salmonella | 610 | 24 | 475 | 18 |
| Enteroviruses | 0 | – | 4 | 0 |
| **Physico-chemical** | | | | |
| pH | 4 033 | 8 | 4 288 | 5 |
| Colour | 4 000 | 99 | 4 069 | 151 |
| Mineral oils | 4 000 | 0 | 4 110 | 0 |
| Surface-active substances | 4 000 | 0 | 4 110 | 0 |
| Phenols | 4 000 | 10 | 4 107 | 3 |
| Transparency | 4 000 | 259 | 3 986 | 251 |
| Floating materials (1) | – | – | 4 287 | 602 |

(1) Guide value only.

Of the 4 001 points sampled at the frequency required, 94% complied with the mandatory values set for total and faecal coliforms. This was equivalent to 88% of all the 4 288 identified bathing areas.

Reference to the figures for 1991 and 1992 shows that 68 sampling points, or approximately 1.6% of bathing areas, did not comply with limit values for three consecutive years, indicating a recurrent pollution problem in these areas.

On the other hand, for the 1993 bathing season, 82% of the monitoring points complied with the guide values for total coliforms and faecal coliforms. In addition, the absence of salmonella was confirmed at approximately 10% of bathing areas. Italy saw no need to monitor for enteroviruses.

Analyses for faecal streptococci were carried out systematically by the Italian authorities, revealing that 93% of bathing areas were respecting the standards.

As already mentioned in the reports on the previous two bathing seasons, the main difficulties as regards the physico-chemical parameters recorded concerned

colour and transparency. These problems affected 4 and 6% of the areas inspected respectively.

The results from the 4 226 points where at least 10 samples were taken were evaluated on the basis of Ministry of Health Circular No 27 of 25 July 1988; of the bathing areas, 92.6% complied with the national limit values for all the parameters listed in Presidential Decree No 470/82.

B — *Freshwater bathing areas*

The number of freshwater bathing areas monitored increased slightly compared with 1992. The results relate to 11 water courses for which 52 sampling points have been identified.

The other sampling points, which in fact constitute the majority of freshwater bathing areas, are on lakes.

***Table 2* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 620 | 82 | 615 | 55 |
| Faecal coliforms | 620 | 95 | 615 | 52 |
| Faecal streptococci (1) | 622 | 104 | 665 | 149 |
| Salmonella | 210 | 36 | 222 | 46 |
| Enteroviruses | 1 | 0 | 1 | 0 |
| **Physico-chemical** | | | | |
| pH | 622 | 88 | 665 | 115 |
| Colour | 620 | 28 | 615 | 8 |
| Mineral oils | 620 | 0 | 624 | 0 |
| Surface-active substances | 620 | 0 | 624 | 0 |
| Phenols | 620 | 0 | 624 | 0 |
| Transparency | 622 | 23 | 620 | 42 |
| Floating materials (1) | — | — | 665 | 267 |

(1) Guide value only.

Of the 611 points sampled at the frequency required, 88% complied with the mandatory values set for total and faecal coliforms. This was equivalent to 81% of all the 665 identified bathing areas.

Reference to the figures for 1991 and 1992 shows that 24 sampling points, or approximately 4% of bathing areas, did not comply with limit values for three consecutive years, indicating a recurrent pollution problem in these areas.

On the other hand, for the 1993 bathing season, 58% of the monitoring points complied with the guide values for total and faecal coliforms. In addition, the presence of salmonella was detected at 4% of bathing areas. Italy saw no need to monitor for enteroviruses.

Analyses for faecal streptococci were carried out systematically by the Italian authorities, revealing that 78% of bathing areas complied with the standard laid down by the Directive, which is a guide value only.

It was found that 34.6% of the sampling points complied with the national limit values set by Presidential Decree No 470/82.

The microbiological parameters are virtually the only limiting factors for river-water quality, whereas in lakes, pH levels and the dissolved oxygen content pose added problems.

## 2. General information

*Public information*

The Ministry of Health publishes a detailed annual report on bathing water quality. This is supplemented by a number of maps showing the state of the waters along the Italian coastline and the state of inland waters.

Moreover, since 1991, the information obtained from the monitoring programme is shown in the teletext pages concerning prohibition of bathing. This service is to be improved over the next few years.

*Improvement schemes*

The Italian authorities have not notified improvement schemes designed to solve recurrent pollution problems.

*Scientific research*

The Italian Ministry of Health has carried out a joint multidisciplinary study with the University of Rome on quality indicators for bathing water. The study showed that faecal coliforms are the most reliable indicators of the presence of pathogenic organisms other than enteroviruses.

It also found that the transportation of samples could significantly affect the results of analyses, particularly in the case of salmonella.

## 3. Maps

Maps 10 and 11 show the results for the 1993 bathing season for coastal zones and inland zones respectively.

They indicate for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The method of analysis used for these two parameters was membrane filtration with subculture on an appropriate medium. There was no confirmation test.

***Table 3* – Summary of the information given on the maps**

(compliance of bathing areas with the standards for microbiological parameters – coliforms – 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 4 288 | 665 |
| Number of points with inadequate sampling frequency | 287 | 54 |
| Number of points complying with mandatory (I) values | 3 755 | 538 |
| Number of points where bathing was prohibited | 0 | 0 |
| Average sampling frequency | 10.7 | 11.5 |

## 4. Conclusion

Bathing waters in Italy are generally of good quality, and this quality has been maintained for several years now.

There was a significant improvement in the quality of inland bathing waters. This improvement was not explained by the Italian authorities.

# Luxembourg

L

Luxembourg provided a report compiled by the Environment Administration.

Under the Grand Ducal Regulation of 17 May 1979 concerning bathing water quality, the bathing season starts on 15 May and ends on 31 August.

Consequently, a minimum of eight samples is required, although this may be reduced to five where the water quality has complied with the mandatory values for the previous two years.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive, which are the same as the limit values set in Luxembourg legislation, except for the following two parameters, for which Luxembourg legislation lays down the following mandatory values:

faecal streptococci: 1 000/100 ml,

tarry residues: absence.

Directive 76/160/EEC sets only guide values for these parameters, which Luxembourg has not transposed into national legislation.

### *Freshwater bathing areas*

Given the geographical location of the country, all its bathing areas are inland: of these, 11 are in lakes while nine others are in rivers.

***Table 1* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled with the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 15 | 0 | 16 | 0 |
| Faecal coliforms | 15 | 0 | 16 | 0 |
| Faecal streptococci (1) | 9 | 4 | 10 | 5 |
| Salmonella | 0 | – | 0 | – |
| Enteroviruses | 0 | – | 0 | – |

*Table 1 (continued)*

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Physico-chemical** | | | | |
| pH | 15 | 0 | 16 | 0 |
| Colour | 15 | 0 | 16 | 0 |
| Mineral oils | 15 | 0 | 16 | 0 |
| Surface-active substances | 15 | 0 | 16 | 0 |
| Phenols | 15 | 0 | 16 | 0 |
| Transparency | 15 | 3 | 13 | 3 |
| Floating materials (1) | 15 | 0 | 15 | 0 |

(1) Guide value only.

Of the 20 bathing areas sampled during the 1993 season, 16 complied with the mandatory limits set for total and faecal coliforms. Bathing was prohibited in the areas which failed to comply.

Under the laws in force, the competent ministers prohibit bathing as soon as the water falls below the limit values laid down in the Annex to the legislation.

Of the four areas where bathing was banned in 1993, three, all along the Lower Sûre, have been subject to such a ban since 1989.

By contrast, bathing water quality in the areas complying with the mandatory values is generally very high, with 11 of these areas also complying with the guide values for total and faecal coliforms. Luxembourg saw no need to monitor for salmonella and enteroviruses.

The Luxembourg authorities carried out analyses for faecal streptococci in 62% of bathing areas. While all the samples complied with the mandatory value laid down by Luxembourg legislation, only 50% of the samples met the guide value laid down in the Annex to Directive 76/160/EEC.

As regards the physico-chemical parameters, the Luxembourg authorities analysed the following parameters in addition to those for which a mandatory value is set in the Directive: dissolved oxygen (12) and ammonia (14). The limit values were not exceeded.

## 2. General information

*Public information*

Article 9 of the Grand Ducal Regulation specifies that the public should be informed of the results of bathing water quality controls. This information is posted in the local town hall and at the bathing areas concerned.

There are severe penalties for failure to display visible signs at areas where bathing is prohibited.



*Improvement schemes*

The clean-up programme drawn up by the Luxembourg authorities provides for the construction of several sewage treatment plants and other appropriate measures.

The works at Moulin de Bourscheid and the Born-Moersdorf project were completed in 1993. The construction of sewers to take various sources of effluent have resulted in a marked improvement in the bacteriological quality of bathing water in these areas.

In 1994, work will start on the construction of the biological sewage treatment plant at Michelau and the connection of the Dillingen sewers to the Echternach purification plant, where additional lagoons will provide further treatment of purified water before it is discharged.

The enlargement and modernization of the Echternach plant is currently being studied with a view to starting work in 1996.

## 3. Maps

Map 1 shows the results for the 1993 bathing season in Luxembourg.

It indicates for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The method of analysis used was membrane filtration with subculture on an appropriate medium. Analysis was not followed by a confirmation test.

***Table 2* — Summary of the information given on the map**

(compliance of bathing areas with the standards for microbiological parameters — coliforms — 1993 bathing season)

| | Freshwater |
|---|---|
| Number of sampling points | 20 |
| Number of points with inadequate sampling frequency | 0 |
| Number of points complying with mandatory (I) values | 16 |
| Number of points where bathing was prohibited | 4 |
| Average sampling frequency | 6.6 |

L

## 4. Conclusion

Bathing water quality has remained relatively constant for several years. Many areas comply with the requirements of the Directive and many satisfy the more stringent guide values.

The planned clean-up work will eventually solve the permanent pollution problems, particularly in the Lower Sûre.

# The Netherlands

NL

The Netherlands provided a report prepared by the Ministry of Transport and Public Works.

The bathing season runs from 15 May to 15 September.

The minimum number of samples which must be taken is therefore nine, although this may be reduced to five in bathing areas where the water quality has complied with the mandatory standards for the previous two years.

Two separate authorities are responsible for monitoring bathing areas: the State and the regional authorities.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive. However, Dutch legislation lays down different standards from the Directive for the following parameters:

thermotolerant coliforms: $\leqslant$ 3/ml (median value),

faecal streptococci: $\leqslant$ 3/ml (median value),

salmonella: absence in 100 ml,

enteroviruses: absence in 1 litre,

surface-active substances: $\leqslant$ 0.2 ml/l,

mineral oils: $\leqslant$ 0.2 mg/l,

phenols: $\leqslant$ 0.001 mg/l,

dissolved oxygen: $\geqslant$ 5 mg/l,

organic wastes: absence,

pH: 6.5 to 9.0.

Consequently, a different assessment of bathing water quality in certain areas would probably be made if the mandatory values set in the Directive (which are less stringent than the national standards) were taken as the reference values.

Also, unlike the Directive, Dutch legislation takes no account of total coliforms as an indicator of pollution. The Dutch authorities have concluded from scientific studies that this parameter is redundant, as compared with faecal coliforms.

Nevertheless, total coliform counts were taken for a limited number of bathing areas, at the request of districts wishing to participate in the blue flag campaign,

as compliance with the guide value for total coliforms is one of the requirements imposed by the FEEE (Foundation for Environmental Education in Europe).

Moreover, with effect from the start of the 1994 bathing season, Dutch legislation has been amended to take account of total coliform counts. In addition, limit values for other parameters have been amended.

A — *Seawater bathing areas*

Only zones located directly on the coast have been included in this category. All other zones, including those where the water is brackish or has a high salt content due to the specific hydrological situation of the Netherlands, have been included with the inland waters.

The data cover 45 bathing areas.

***Table 1* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 26 | 0 | 29 | 0 |
| Faecal coliforms | 41 | 3 | 39 | 0 |
| Faecal streptococci (1) | 38 | 10 | 41 | 5 |
| Salmonella | 3 | 0 | 18 | 1 |
| Enteroviruses | 0 | — | 0 | — |
| **Physico-chemical** | | | | |
| pH | 42 | 3 | 45 | 1 |
| Colour | 27 | 0 | 20 | 0 |
| Mineral oils | 27 | 0 | 20 | 0 |
| Surface-active substances | 27 | 5 | 20 | 2 |
| Phenols | 27 | 0 | 6 | 0 |
| Transparency | 32 | 31 | 26 | 25 (2) |
| Floating materials (1) | 21 | 0 | 20 | 0 |

(1) Guide value only.
(2) See text for explanation.

All the 39 areas sampled at the required frequency complied with the mandatory values set for faecal coliforms. This was equivalent to 87% of all 45 identified bathing areas.

For the 1993 bathing season, 69% of the sampling points met the guide value for faecal coliforms. No salmonella was detected at any of these points.

The presence of enteroviruses was not examined because the analysis is expensive and difficult to carry out. Scientific research is currently being undertaken in order to establish the relevance of bacteriophages as indicators of viral presence in bathing waters.

Systematic tests were carried out for faecal streptococci; 88% of the bathing areas complied with the guide value laid down in the Directive.

As regards the physico-chemical parameters, transparency posed major problems because of geographical conditions specific to the North Sea.

B — *Freshwater bathing areas*

Results from 456 sampling points were received. This is a much lower figure than last season because some regions were unable to send in their results before the deadline. Information from some 100 sampling points is missing, which represents 18% of the bathing areas identified in 1992.

Moreover, some changes in the location of sampling points were noticed. Although the number of bathing areas identified appeared to remain constant for the 1991 and 1992 seasons, 36 sampling points were in fact withdrawn in 1991 and 40 in 1992. For the 1993 season, 31 sampling points have been dropped from the monitoring programme.

These changes in the location of the sampling points are related to a reduction in the number of sampling points in a bathing area or to a simple relocalization of the point within the bathing area. In other cases, sampling was carried out at the request of private bodies and therefore these points are not included permanently in the monitoring programme.

***Table 2** — Compliance rate for the parameters measured or assessed*

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 0 | — | 0 | — |
| Faecal coliforms | 472 | 54 | 346 | 33 |
| Faecal streptococci (1) | 38 | 9 | 25 | 8 |
| Salmonella | 24 | 6 | 8 | 2 |
| Enteroviruses | 0 | — | 0 | — |

*Table 2 (continued)*

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Physico-chemical** | | | | |
| pH | 527 | 168 | 425 | 103 |
| Colour | 346 | 168 | 217 | 88 |
| Mineral oils | 229 | 20 | 199 | 8 |
| Surface-active substances | 255 | 46 | 194 | 11 |
| Phenols | 389 | 92 | 268 | 86 |
| Transparency | 500 | 413 | 258 | 192 |
| Floating materials (1) | 271 | 44 | 228 | 20 |

(1) Guide value only.

Of the areas sampled at the required frequency (346), 90% met the mandatory value set for faecal coliforms. This was equivalent to 67% of all the 456 identified bathing areas.

Taking the 1991 and 1992 seasons into account, only one sampling point did not comply with the mandatory values for three consecutive years, which indicates that the bathing areas are exposed to few sources of recurrent pollution.

For the 1993 bathing season, 43% of the sampling points complied with the guide value for faecal coliforms. The Netherlands saw no need for intensive monitoring of salmonella and enteroviruses because there was no deterioration of the bathing water quality and their presence was not expected. As a consequence, there is no intensive monitoring programme for these two parameters.

For enteroviruses, scientific research was carried out, as for coastal zones, on the relevance of the bacteriophages as indicators for enteroviruses in bathing waters.

The Dutch authorities carried out tests for faecal streptococci, for which there is only a guide value set, at a very limited number of bathing areas (0.6%). One third of the results collected in these areas did not comply with the guide value.

Given the large number of bathing areas for which results were not received, it is difficult to assess the situation compared with last year.

As regards the physico-chemical parameters, the pH, colour, phenols and transparency limits were frequently exceeded. However, in many cases, these phenomena were due to natural conditions.

In addition, eutrophication was a further factor pushing some of the results over the limits. For example, algal growth reduces water transparency.

## 2. General information



*Public information*

The authorities responsible for the monitoring of bathing waters and for information to the public are the provinces. In some cases, the responsibility is with water-management and sanitation bodies.

The means of informing the public can vary from one province to another. In general, leaflets with the results and the assessment of water quality are provided by tourist offices and provincial administrations.

For popular bathing areas, notices are displayed at bathing places.

In some cases, the most recent results are published in the local press or are available by a telephone service.

It is probable that, in the future, information concerning bathing water quality will be available from teletext.

*Improvement schemes*

General directives concerning action for the sanitation of bathing areas are included in the documents setting out national policy. They are issued every four to seven years.

In these documents, it is pointed out that the quality of water has to be assessed in advance to allow bathing and identify a bathing area.

At a regional level, there also exist plans for management of waters and sanitation action, including improvement action for bathing water of poor quality. In cases of temporary deterioration of water quality, causes are investigated in order to take the appropriate action. Some examples of improvement action are the cutting of aquatic plants, the removal of sludges and the renewal of water.

## 3. Maps

Map 1 shows the results for the 1993 bathing season in the Netherlands.

It indicates for each district the compliance of bathing zones with the mandatory (I) value for faecal coliforms.

The analysis of this parameter was carried out using the methods laid down in the Directive. Depending on the laboratory, either membrane filtration with subculture on an appropriate medium and confirmation of colonies was used, or fermentation in multiple tubes on two consecutive mediums and confirmation.

NL

*Table 3* — **Summary of the information given on the map**

(compliance of bathing areas with the standards for microbiological parameters — coliforms — 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 45 | 456 |
| Number of points with inadequate sampling frequency | 6 | 110 |
| Number of points complying with mandatory (I) values | 39 | 313 |
| Number of points where bathing was prohibited | 0 | 0 |
| Average sampling frequency | 9.0 | 7.8 |

## 4. Conclusion

The seawater bathing areas are generally of high quality.

For the inland zones, it is difficult to assess the water quality compared with previous seasons, because a large amount of data is missing. Nevertheless, based on comparable data, it may be said that inland water quality has been maintained throughout the 1993 bathing season.

# Portugal

PT

The derogation exempting Portugal from applying Directive 76/160/EEC, granted when Portugal joined the Community, expired on 31 December 1992.

Portugal provided a report compiled by the Ministry of the Environment and Natural Resources and the Ministry of Health on the basis of data supplied by the competent national authorities.

At all bathing areas, the bathing season runs from 1 June to 30 September.

A minimum of nine samples must therefore be taken, although this may be reduced to five where the water complied with the mandatory values for the previous two years.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive, which are the same as the limit values laid down in Portuguese legislation. Portuguese legislation sets two types of value: the maximum permitted value and the maximum recommended value, corresponding to the mandatory value and the guide value respectively.

The Directive sets only guide values for faecal streptococci and floating materials. The results for these parameters were therefore assessed on the basis of these guide values.

Sampling is generally carried out at a representative point in the bathing area. In certain cases, however, where more intensive monitoring is required, there are several sampling points in the same bathing area. In such cases, the Portuguese authorities send the Commission the worst results for the bathing area concerned.

### A — *Seawater bathing areas*

The monitoring programme covered 312 sampling points in coastal bathing areas. This was 86 more than in 1992. The new bathing areas include 15 estuaries.

The number of identified bathing areas has almost doubled since 1991, rising from 160 to 312. Given the high quality of bathing water in Portugal, it was possible to monitor more areas by reducing the frequency of monitoring in areas which complied with the mandatory values during the previous two bathing seasons.

PT

*Table 1* – **Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 208 | 13 | 208 | 17 |
| Faecal coliforms | 208 | 16 | 278 | 24 |
| Faecal streptococci (1) | 210 | 18 | 282 | 34 |
| Salmonella | 0 | – | 218 | 0 |
| Enteroviruses | 0 | – | 0 | – |
| **Physico-chemical** | | | | |
| pH | – | – | 124 | 2 |
| Colour | 0 | – | 232 | 51 |
| Mineral oils | 208 | 5 | 270 | 49 |
| Surface-active substances | 208 | 41 | 260 | 55 |
| Phenols | 208 | 4 | 265 | 6 |
| Transparency | 0 | – | 14 | 3 |
| Floating materials (1) | – | – | 220 | 18 |

(1) Guide value only.

A total of 90% of the 278 areas sampled at the required frequency complied with the mandatory values set for total and faecal coliforms. This was equivalent to 80% of all 312 identified bathing areas.

Reference to the figures for 1991 and 1992 shows that only three sampling points failed to comply with the limit values for three consecutive years, indicating that there are few recurrent sources of pollution affecting bathing areas.

For the 1993 bathing season, 68% of the sampling points complied with the guide values for total and faecal coliforms.

This year, for the first time, monitoring for salmonella was carried out on a large scale (70% of bathing areas). The presence of salmonella was not detected. Portugal saw no need to monitor for enteroviruses.

The Portuguese authorities systematically carried out faecal streptococci counts. The Directive lays down a guide value only, which was met by 88% of bathing areas.

As regards the physico-chemical parameters, the limit values for colour, mineral oils and surface-active substances were exceeded in about 20% of areas sampled at the required frequency. The mineral oil residues probably come from oil discharged off the Portuguese coast.

Visual inspection for lasting foam, as laid down in the Directive, is not sufficient to determine with certainty whether such foam is caused by surface-active substances. In the case of Portuguese coastal waters, lasting foam can be linked to natural phenomena such as slime produced by algae.

The limit value for phenols was exceeded in just a few cases.

Transparency was generally not monitored.

B – *Freshwater bathing areas*

This year, for the first time, the bathing water monitoring programme included inland bathing areas. However, the number of areas monitored was limited, as bathing is less common here than in coastal waters.

***Table 2* – Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | – | – | 8 | 0 |
| Faecal coliforms | – | – | 8 | 1 |
| Faecal streptococci (1) | – | – | 24 | 3 |
| Salmonella | – | – | 23 | 0 |
| Enteroviruses | – | – | – | – |
| **Physico-chemical** | | | | |
| pH | – | – | 14 | 0 |
| Colour | – | – | 7 | 5 |
| Mineral oils | – | – | 8 | 3 |
| Surface-active substances | – | – | 7 | 2 |
| Phenols | – | – | 7 | 0 |
| Transparency | – | – | – | – |
| Floating materials (1) | – | – | 7 | 3 |

(1) Guide value only.

It is difficult to assess the quality of freshwater bathing areas, as sampling was insufficient in most areas: only 33% of areas were sampled with the required frequency.

On the basis of a reduced sampling frequency, the compliance rate for total and faecal coliforms can be estimated at approximately 88%.

On the same basis, the rate of compliance with the guide values can be estimated at approximately 21%.

The Portuguese authorities systematically carried out faecal streptococci and salmonella counts. No salmonella was detected. Faecal streptococci were detected at three bathing areas.

## 2. General information

*Public information*

Since 1989, the Portuguese authorities have published a bathing water quality map to keep the public informed. This is displayed and distributed at bathing areas, medical centres, tourist offices and ports. The results are also publicized in the media.

*Improvement schemes*

One of the biggest improvement schemes concerns more than 22 000 hectares of the Estoril coast west of Lisbon. This area is undergoing rapid development, essentially linked to tourism. The population is currently 600 000, with an additional fluctuating tourist population during the summer.

The sewage collection and treatment system has not kept pace with the increase in population, which is expected to grow further to reach a total of 1 500 000. As a result, bathing areas in this region are regularly contaminated by sewage discharges. The level of contamination varies with the tide and the direction of the wind.

At present there is only preliminary treatment before the effluent is discharged into Cascais bay.

In order to preserve the environment and maintain the quality of life, the health authorities in the Estoril region have drawn up an improvement scheme to ensure that sewage is properly treated before being discharged.

The plan is to construct a 24-km-long sewer to carry waste water to a sewage treatment plant. The treated sewage will then be discharged via a 2.6-km-long undersea pipeline. This will bring the quality of the bathing water up to the guide values laid down in the Directive.

Construction work began in 1987 and should be completed in 1994. The cost is estimated at ECU 112 million.

## 3. Maps

Map 6 shows the results for the 1993 bathing season in Portugal.

It indicates for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The method of analysis used for these two parameters was lactose fermentation in multiple tubes followed by a confirmation test.

***Table 3* – Summary of the information given on the map**

(compliance of bathing areas with the standards for microbiological parameters – coliforms – 1993 bathing season)

| | Seawater | Freshwater |
|---|---|---|
| Number of sampling points | 312 | 24 |
| Number of points with inadequate sampling frequency | 34 | 16 |
| Number of points complying with mandatory (I) values | 252 | 7 |
| Number of points where bathing was prohibited | 0 | 0 |
| Average sampling frequency | 9.4 | 7.8 |

## 4. Conclusion

The results reported in 1993 confirm the high quality of bathing water in Portugal.

Monitoring of bathing areas was increased substantially in 1992 and 1993: the number of areas sampled has doubled since 1991. The monitoring programme was also extended to include inland bathing areas.

Work is in progress to ensure that bathing water complies with the quality requirements. Implementation of Directive 91/271/EEC concerning urban waste-water treatment should also help to improve the quality of bathing water in the future.

# United Kingdom

UK

For the 1993 bathing season, the United Kingdom provided a report prepared by the competent national authorities.

Generally, the bathing season runs from 15 May to 30 September in England and Wales and from 1 June to 15 September in Scotland and Northern Ireland. Some variations due to geographical factors and climate are nevertheless possible.

Therefore, the minimum number of samples which must be taken is 10 and 6 respectively. However, this may be reduced to six and four respectively in bathing areas where the water quality has complied with the mandatory values for the previous two years. Nevertheless, the results for most bathing areas are based on a minimum of 20 samples taken each week throughout the bathing season.

In Gibraltar, the bathing season runs from 15 April to 30 October which means that a minimum of 14 samples must be taken.

## 1. Results

The results were assessed on the basis of the mandatory values laid down in the Directive. These, in any case, correspond to the limit values laid down in United Kingdom legislation. As the Directive sets only a guide value for faecal streptococci, the results for this parameter were assessed on the basis of this guide value.

*Seawater bathing areas*

During the 1993 bathing season, three bathing areas were added to the monitoring programme bringing the total to 458. However, because of work on an improvement scheme, access to one bathing area was prohibited during 1993. Consequently, the results cover only 457 areas.

In addition, the British authorities have also notified the results of analyses conducted at six bathing areas in Gibraltar.

***Table 1* — Compliance rate for the parameters measured or assessed**

(T = number of areas sampled at the required frequency; NC = number of areas not complying)

| Parameters | 1992 | | 1993 | |
|---|---|---|---|---|
| | T | NC | T | NC |
| **Microbiological** | | | | |
| Total coliforms | 455 | 52 | 457 | 42 |
| Faecal coliforms | 455 | 95 | 457 | 91 |
| Faecal streptococci (1) | 432 | 255 | 440 | 256 |
| Salmonella | 432 | 71 | 440 | 83 |
| Enteroviruses | 307 | 209 | 199 | 104 |
| **Physico-chemical** | | | | |
| pH | 326 | 1 | 437 | 5 |
| Colour | 454 | 0 | 457 | 0 (2) |
| Mineral oils | 448 | 0 | 457 | 0 |
| Surface-active substances | 448 | 2 | 457 | 1 |
| Phenols | 448 | 0 | 457 | 0 |
| Transparency | 171 | 4 | 391 | 6 (2) |
| Floating materials (1) | — | — | — | — |

(1) Guide value only.
(2) Article 8 applied.

In the 1993 bathing season, 80% of the sampling points complied with the mandatory values set for total and faecal coliforms. Compared with 1992, a slight improvement in bathing water quality was observed, in spite of poor summer weather.

Reference to the figures for 1991 and 1992 shows that 42 sampling points, or approximately 9% of bathing areas, did not comply with the limit values for three consecutive years, indicating a recurrent pollution problem in these areas.

For the 1993 bathing season, 140 (31%) of the bathing areas met the guide values for total and faecal coliforms. Amongst these sampling points, 109 were also free of salmonella and enteroviruses.

Tests for salmonella were carried out at virtually every sampling point. Enteroviruses were checked at every bathing area which failed to meet the coliform standards laid down in the Directive in 1992, and in other areas too.

As regards the physico-chemical parameters, general application of visual and olfactory inspections ensured that the improvements recorded in 1992 continued, although in England and Wales preference is given to the methods of analysis described in the Directive when there are doubts about compliance.

In the case of transparency, waivers were granted to most of the bathing areas, because of the influence of tides and wave in accordance with Article 8 of the Directive. These waivers were also used in some cases for the 'colour' parameter.

The six bathing areas identified in Gibraltar complied with the mandatory values for all microbiological and physico-chemical parameters and five of them also complied with the guide values for all these parameters.

## 2. General information

*Public information*

To keep the public informed about bathing water quality, a poster scheme showing the latest results of coliform analyses was introduced in England and Wales in 1991. In 1992, this scheme was extended to bathing areas in Scotland and Northern Ireland.

*Improvement schemes*

In order to restore the quality of the bathing areas which do not comply with the standards set by the Directive, the British authorities have adopted a UKL 2 billion improvement programme covering 92 bathing areas. In 1992, improvement schemes for 26 bathing areas had been completed or brought into operation. This increased to 40 by the end of 1993.

*Scientific research*

The United Kingdom Government and the authorities responsible funded an important research programme on the health risks of sea-bathing. It was a four-year epidemiological study using two complementary approaches: a cohort study and a beach survey study. The first study involved 16 500 people at 10 beaches and the second involved 1 112 volunteers at four beaches. In both cases, the waters were subjected to numerous quality control tests.

The research was completed in 1993 and the final report of the results published in January 1994. The report contains conclusions on perception of illnesses and symptoms and the effects of seawater and contamination levels on human health.

Among other things, the study concluded that the limit values contained in the Annex to Directive 76/160/EEC give adequate protection to bathers' health. This should reassure bathers in the United Kingdom. Another conclusion is that bathers may experience eye or skin irritations or ear problems after prolonged sea-bathing irrespective of the level of microbiological contamination.

The full report can be obtained from:

Water Research Centre
Henley Road
Medmenham, Marlow, Bucks SL7 2HD.

## 3. Maps

Map 9 shows the results for the 1993 bathing season in the United Kingdom.

It indicates for each district the compliance of the bathing zones with the mandatory (I) values laid down in the Directive for total and faecal coliforms.

The method of analysis used for these two parameters was membrane filtration and culture on an appropriate medium. Confirmation tests were carried out.

This year's map contains an inset showing Gibraltar. Since it is a special-status European territory, its results are shown separately.

***Table 2* – Summary of the information given on the map**

(compliance of bathing areas with the standards for microbiological parameters – coliforms – 1993 bathing season)

| | Seawater |
|---|---|
| Number of sampling points | 457 |
| Number of points with inadequate sampling frequency | 0 |
| Number of points complying with mandatory (I) values | 365 |
| Number of points where bathing was prohibited | 0 |
| Average sampling frequency | 20.3 |

*Gibraltar*

***Table 3* – Summary of the information given on the map**

(compliance of bathing areas with the standards for microbiological parameters – coliforms – 1993 bathing season)

| | Seawater |
|---|---|
| Number of sampling points | 6 |
| Number of points with inadequate sampling frequency | 0 |
| Number of points complying with mandatory (I) values | 6 |
| Number of points where bathing was prohibited | 0 |
| Average sampling frequency | 26.0 |

## 4. Conclusion

The situation has been improving over the last few years. The proportion of areas complying with the standards has been rising steadily, and in 1993 passed the 80% mark.

By the end of 1995, the clean-up programme should have brought virtually all the identified bathing areas into compliance with the Directive.

European Commission

**EUR 15399 – Quality of bathing water – 1993**

Luxembourg: Office for Official Publications of the European Communities

1994 – 89 pp., num. tab., fig. – 16.7 × 23.7 cm

Environment and quality of life series

ISBN 92-826-7725-7

This report contains, for each Member State:

- a summary of the principal parameters for bathing water and of any changes compared with the previous year;
- one or more maps showing the microbiological quality of bathing water in each district.